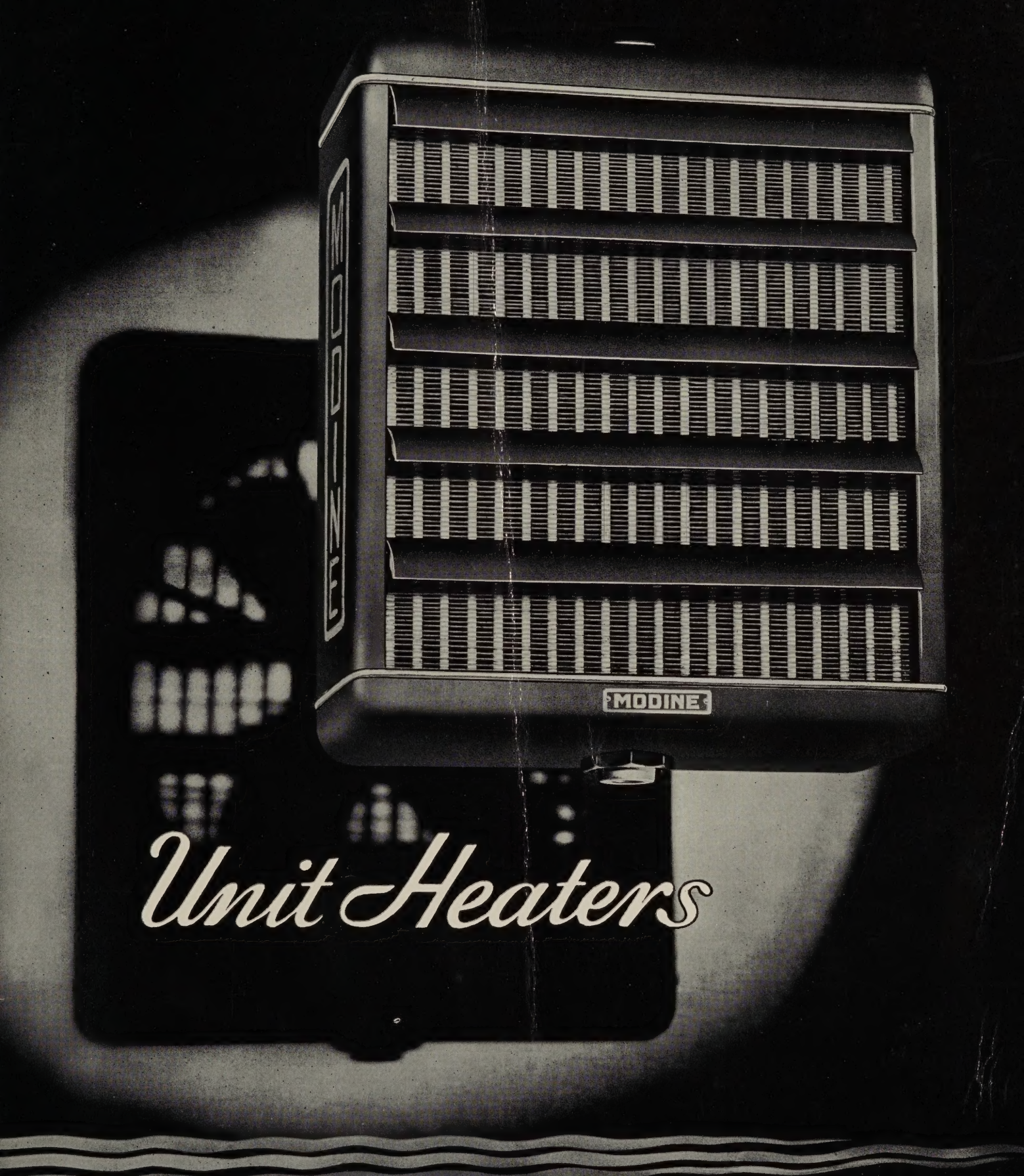


Unit Heaters

MODINE MANUFACTURING CO.
RACINE WISCONSIN
CATALOG 137


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HEATING WITH UNIT HEATERS

HEATING EQUIPMENT SALES CO.
251 NORTH BROAD STREET
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TEL. ELIZ. 2 - 1425

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HEATING
WITH UNIT HEATERS

Unit heaters are a direct outgrowth of the central blast heating system popular a generation ago for factory heating.

The blast heating system consisted of a blower or centrifugal fan with a massed assembly of pipe coils or cast iron sections to receive the hot water or steam—enclosed in a sheet iron housing. In later years, copper coils were sometimes used. The heated air was distributed by a system of unsightly and ponderously bulky ducts which not only interfered with factory machinery but was itself subject to frequent damage.

To overcome these objections, blast heating systems of smaller units were designed. Finally, duct work was eliminated entirely. Steam or hot water was conducted through small pipes to comparatively small heater units with localized, ductless heating of the air. Thus was the unit heater evolved.



This Ideal Modine Unit Heater Installation Provides Better Heating at Less Cost

Unit Heaters Cost Less to Install

In the average industrial plant, a few unit heaters insure equal capacity and are installed in about one-fourth the time—a big saving in labor cost over the pipe coil, wall or cast iron radiation which they have displaced. Actual material costs are less, too.

Unit Heaters Cost Less to Operate

Unit heating saves fuel because heat is delivered directly to the zone where it is needed. Little heat is wasted through the walls and roof . . . no parts of the building are overheated. Recent tests conducted by the Engineering Department of a large University showed that suspended type unit heaters used as much as 25% less fuel than a direct radiation system under identical operating conditions.

Unit Heaters Save Space

With unit heating, the floor and wall space which other types of heating required, is now devoted to productive uses.

Unit Heaters Distribute Heat More Evenly

In unit heating, the heat diffusing units are located at strategic points throughout the area to be heated. As the heat is delivered downward, its effect is spread over the particular area served by each unit, and is then further distributed by natural diffusion so that it overlaps the areas served by adjoining units. The result is a more even temperature throughout the entire area. You will not find a temperature of 85° along the walls and 65° in the center of the room. There is no marked difference between ceiling and floor temperatures.

Unit Heaters More Responsive to Changing Temperature Requirements

Unit heaters are more flexible in operation, control being simple, either manually or automatically. Because of their faculty of quick heating, unit heaters are much more responsive to requirements of sudden changes in the outside temperature. There is no waiting for unit heaters to heat up. If there is steam in the line, heat will be delivered immediately the unit heater is switched on.

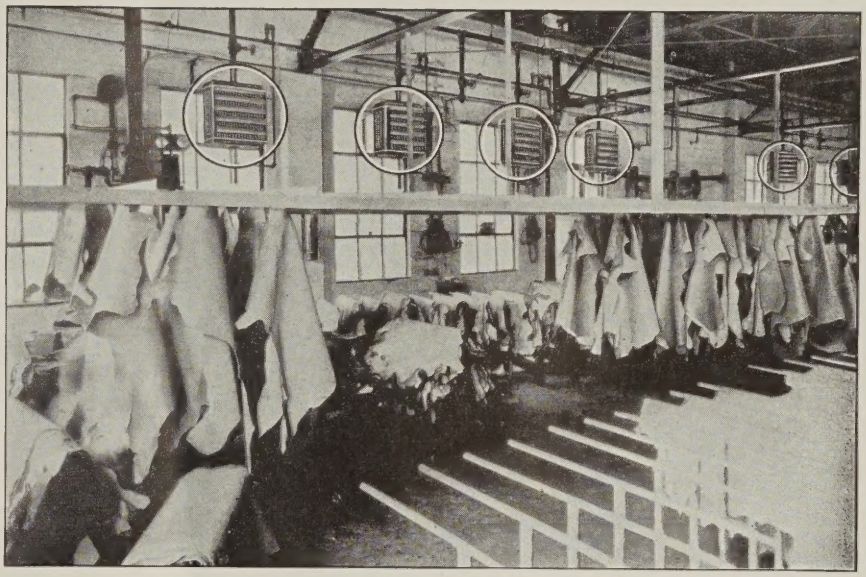
Unit Heating is Healthier Heating

Because the unit heater system, regardless of temperature changes outside, maintains more even temperatures, it makes for more healthful working conditions in any industrial plant. Maintaining the right temperature for comfort and health betters employee attendance, cuts down time lost on account of sickness, tends to increase production per man.

Industrial Drying

An application for unit heaters that has grown steadily during the past few years is Industrial Drying. Unit heaters are now considered the most satisfactory and economical method of drying products such as leather, paints and enamels, candy, paper, felt, textiles, woods, glass and ceramic products.

Combining in one complete unit high heat capacity with air circulation, unit heaters speed up the drying process tremendously, thus cutting drying cost. The heat delivered is convected heat—the air surrounding the product first being heated and then that heat transferred to the product to be dried. As the heated air is distributed thoroughly throughout the drying area, the drying operation proceeds at approximately the same rate at all points in the area. This results in faster, more uniform drying, and practically eliminates the spoilage that was sometimes thought unavoidable in drying operations.



Modines Speed Up and Improve Drying in Leather Plant

Special Unit Heaters for Textile Mills

In certain textile mill operations there is lint present in the air which, when drawn into the condenser of the average unit heater, tends to cling to the horizontal fins of the condenser, thus seriously impeding and eventually preventing passage of air through the unit. Where a considerable amount of lint is present this means weekly or even semi-weekly "blowing out" or brushing of the condensers. While the use of wire mesh screens and air filters relieves the situation to some extent, they too require frequent cleaning, else the heating effectiveness of the unit heater is appreciably handicapped.

To answer the requirements of this type of industrial heating Modine has developed a unit heater *designed specifically* for textile mill application. The horizontal fins used in this unit are so designed, treated and spaced that a particle of lint impinges on the fin *only momentarily* and is then carried or blown through the condenser. Where these special units have been installed, clogging of the unit condensers has either been completely eliminated, or, where an extremely serious lint condition exists, been reduced to a point where only infrequent cleaning of the condensers is necessary.

Because of their special nature, Modine Textype Units are described in a separate bulletin, No. 836. Detailed information can be secured from Modine sales offices or from the Factory direct.

Why Industry Is Replacing Old Systems with Unit Heating

Why are owners of industrial and commercial buildings replacing existing heating systems with unit heating?

Because old pipe coil, cast iron radiation, and blast heating systems are wearing out . . . and it is only logical to replace them with what any builder of a new factory would employ nowadays—unit heaters.

Because old systems are not heating satisfactorily. On the other hand, unit heaters have rendered perfect satisfaction on thousands of industrial jobs. This definitely assures the factory building owner, who wants better heating, that he can get it . . . and at moderate cost.

Because pipe coil and other obsolete heating equipment for factories have proved wasteful of fuel . . . factory owners or lessees demand that this waste be ended. In many cases installations of unit heaters pay for themselves in fuel economy in a few years.

Because a unit heater system can be initially laid out in the form which it will finally assume. Yet it may be purchased piece-meal . . . one group of units to follow another as the budget permits . . . until the installation is completely modernized. And installation costs are only modestly increased by such an "installment" method of purchase.

The MODINE UNIT HEATER

The statement—"More Modines are sold than any other unit heater"—is not just an unfounded advertising claim. More Modine Unit Heaters have been sold, because Modine quality has always been a standard in the unit heater industry; because Modine pioneered the suspended type unit heater; because Modine engineers are constantly striving to improve the performance and better the construction of Modine Unit Heaters.

Why Modine continues to be the most popular, most dependable suspended type unit heater is best exemplified by briefly summarizing the outstanding features of the Modine Unit Heater.

Greater Strength

All steam carrying passages are cylindrical, and are welded and brazed into a single structure—no gaskets, bolts or screw joints. In addition, the condenser is copper or copper alloy throughout. The greatest contribution to the unit's strength, however, is its provision for individual tube expansion.

Provision for Tube Expansion

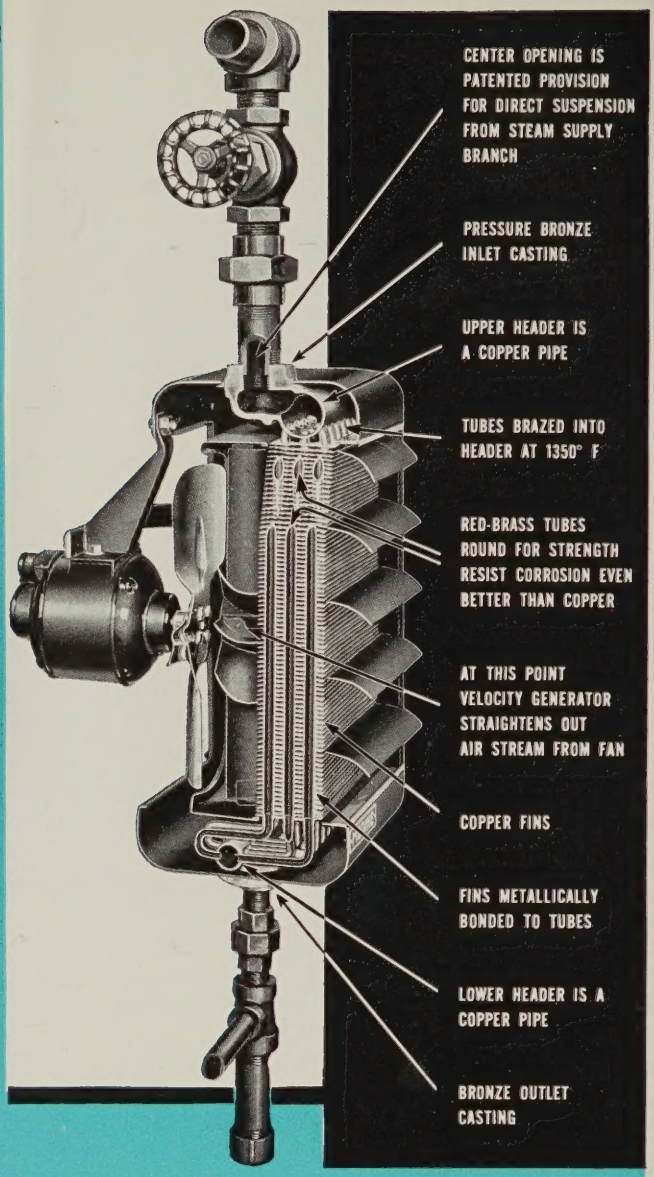
This Modine development permits each tube of the condenser to expand or contract individually, entirely independent of similar action taking place in tubes adjacent to it. This method of providing for tube expansion is the result of several years study by Modine engineers of unit heater condenser failures, failures that in most cases were caused by insufficient expansion allowance.

Superior Performance

The Modine Unit Heaters are equipped with velocity generators (another exclusive Modine feature) that not only direct and control the air stream leaving the heater thus giving greater "heat throw," but do so without increasing power requirements. The general design of the Modine condenser plus the velocity generator and other air control features assure far more effective and economical distribution of heat.

Direct Pipe Suspension

The Modine Unit Heater was the first unit heater designed for direct suspension from the steam pipe line. This patented feature means easier and less expensive installation, facilitates redirection of the air stream by permitting full 360° rotatability of the unit and greatly simplifies re-location of units after installation.



Beauty

The Modine Unit Heater has set an entirely new standard in unit heater appearance. The sturdy, rounded casings of all units except the Model 76, are finished in black, baked enamel, with chromium-plated metal moulding at top and bottom. The Model 76 is chromium plated, with contrasting black trim strips. The new Modine proves that good appearance need not be sacrificed in order to secure ruggedness and long life.

Wide Range of Sizes

The line of Modine Unit Heaters, both steam and hot water types, is larger than ever before. All are available with constant and variable speed motors.

THE MODINE COMPANY

For twenty-one years . . . since 1916 . . . the Modine Manufacturing Company has been engaged in the manufacture of heat transfer equipment. It has specialized in the developing, manufacturing and selling of equipment for heating and cooling air.

Arthur B. Modine, founder of the company, and its motivating spirit, was an engineer as well as a manufacturer. He was in constant contact with many different industries and had a broad knowledge of industrial plants. It was obvious to him that the then current methods of industrial heating were not only inefficient but wasteful.

He started experimenting in 1920. And for several years those experiments went tirelessly on. He virtually had to create an entirely new design and yet retain the essential characteristics of high heat transfer peculiar to automotive radiators. Construction had to be adapted to the severe usages which the new equipment would encounter in steam heating applications. Heavier materials had to be selected . . . new processes evolved.

The success of the resulting Modine Unit Heater was immediate. It is now accepted, used and endorsed by the most prominent architects, heating engineers and industrialists of the United States. The fact that more Modine Unit Heaters are now in use than any other make, proves the soundness of its basic principles.

There are two divisions of the Modine Company. (a) *The Heating and Air Conditioning Division* which makes copper radiators for commercial and domestic heating, several types of cooling equipment, the Modine-Syncromatic Air Conditioner, as well as the Modine Unit Heater; (b) *The Automotive Division* which manufactures radiators for cooling internal combustion engines, and automotive heaters.

Heating With
MODINE UNIT HEATERS

WHY DESIGN IS SO IMPORTANT

The past few years have shown the need for a unit heater of new design with greater structural strength. Heating engineers had begun to realize that, under certain conditions, even the best unit heater would fail, although appreciating these conditions to be unduly severe.

Four years ago, Modine engineers began an exhaustive study of unit heater installations. All makes of units that had failed were carefully examined. This survey revealed why unit heaters had failed structurally.

Weakness of Ordinary Designs—Condenser designs permitted flat, unstayed surfaces that bulged under pressure and eventually gave way. Instead of using the stronger cylindrical shape, flat tubes and rectangular tanks were used as steam carrying chambers. When heaters were operated under intermittent high pressures, accompanied by high temperatures, these unstayed surfaces often broke down.

In all unit heaters the condenser design results in unequal expansion and contraction of the several condenser tubes. It is impossible to secure perfectly even distribution of the steam to the tubes so that tube expansion will be equal. Inevitably some tubes expand sooner or to a greater extent than others. Thus, the header sheet becomes distorted and in a short time one or more tubes are torn from it.

GREATER STRENGTH IN THE MODINE DESIGN

It is a physical law that a cylinder is the strongest of all tube-like shapes. In the Modine Unit Heater, *all* steam carrying passages are cylindrical. Its copper tanks, both top and bottom, and the red-brass tubes of the condensers, lying between these tanks, are thereby given a strength many times in excess of normal requirements. These parts will therefore stand pressure or impact, dynamic as well as static, under the severest conditions.

While making the steam passages cylindrical in shape is a decided advantage in providing for expansion, it does not solve the problem entirely. No method has yet been devised whereby all the tubes in a unit heater condenser may be kept at exactly the same temperature; that is, no method which has proved permanently satisfactory in operation.

Since there is bound to be a slight variation in the temperatures of the tubes themselves . . . causing unequal expansion . . . the correct solution is to permit the tubes to *expand individually and differentially.*

EXPANSION BEND

In ordinary unit heater construction, the tubes expand unequally and the expansion strain is transferred directly to the tanks. Either the tanks must distort or some of the tubes be torn away from it. In the Modine design, expansion is taken up without being transmitted to the tanks.

This provision for individual tube expansion is the outstanding feature of the Modine Unit Heater. After each tube passes vertically through the condenser, it bends and extends horizontally into the bottom tank. This horizontal section acts as a "flexion" or expansion bend. Since each tube has its own expansion bend, it can expand or contract, as required, entirely independently of similar actions taking place in the tubes adjacent to it. Thus, each tube takes care of its own expansion and contraction problem. This is an exclusive Modine development covered by patent application.

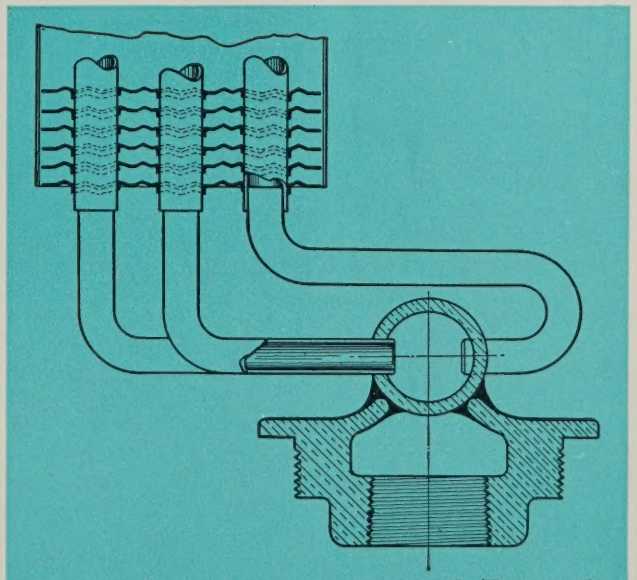


Diagram Shows Tube Construction with Horizontal "Expansion Bend"

The tube design described above . . . with expansion bend between condenser and bottom tank . . . is employed in all the new steam-type Modine Unit Heaters except Model 76. Model 76, the smallest Modine unit, is intended for low pressure operation only, and the costly expansion bend construction is therefore considered unnecessary.

The expansion bend feature is likewise omitted in the hot water models of Unit Heaters inasmuch as the temperatures and pressures encountered on hot water systems are comparatively low.

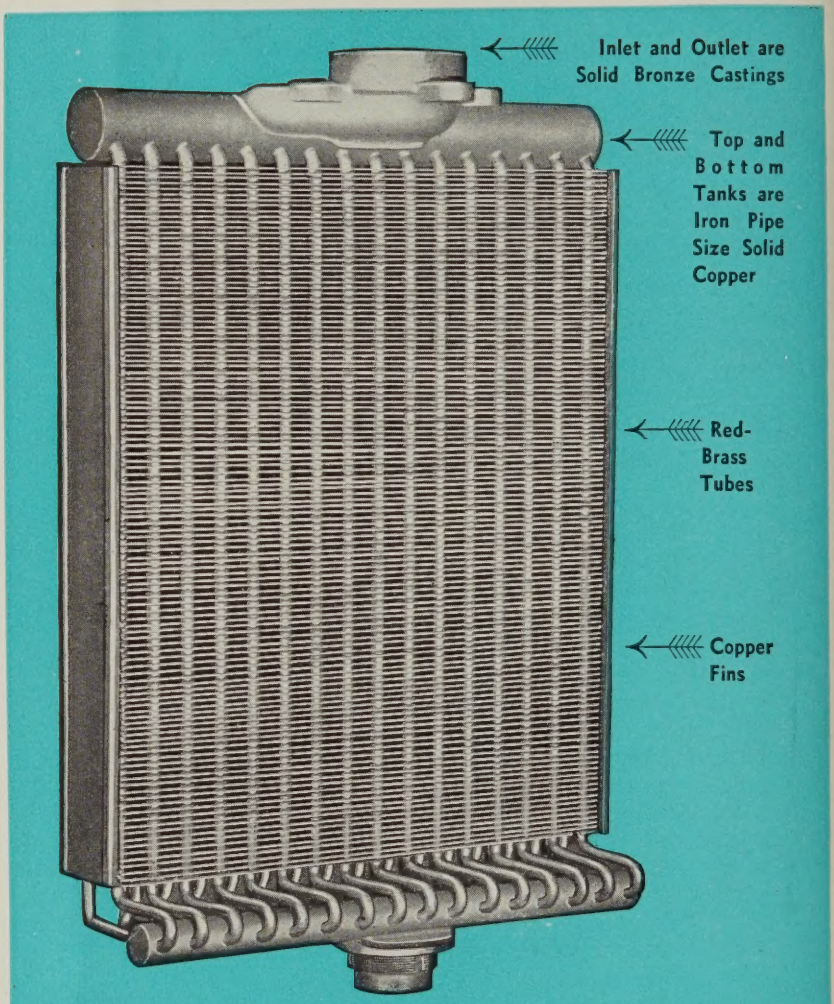
ORDINARY MATERIALS UNSUITABLE

Research disclosed that in many unit heaters, tubes and fins too light in weight to meet even ordinary operating demands, have been used. Tubes were sufficiently sturdy to withstand only moderate pressures under ideal conditions. Fins were so flimsy as to be easily damaged and misaligned so that air flow through condenser was impeded.

Materials subject to corrosion have been generally used. In some localities, water contains impurities that react with even certain non-ferrous metals so that corrosion results. Since corrosion tends to localize its attack, it eventually causes steam leaks in the unit heater tubes at or near the point of juncture with the header where the metal structure has been strained in assembly or where tubes and tanks of unlike materials join, promoting galvanic action.

In the construction of almost all unit heaters combinations of materials that encouraged electrolysis have been used. Direct and constant contact between copper tubes and iron tanks tends to promote electrolysis which has been responsible for many structural failures.

Low melting point bonding materials have been employed which have softened under the temperatures accompanying high steam pressures, causing a break in contact between tube and fin. Failure to obtain a *permanent* metallic bond between fin and tube has brought about an appreciable reduction in heat transfer.



Rear View of Steam Condenser Showing Expansion Bend of Individual Tubes. Note Copper Construction from Inlet to Outlet

MODINE MATERIALS SUITED TO WITHSTAND RIGOROUS OPERATION

The quality of materials that are used is largely responsible for the remarkable strength of the Modine Unit Heater. The cylindrical top and bottom tanks are of heavy-walled seamless copper. Their ample diameter assures thorough distribution of a large volume of steam and rapid elimination of condensate.

Bonding Process—The condenser tubes are heavy gauge, seamless red-brass, 3/8 in. diameter. Sturdy copper fins are metallically bonded to the tubes by an entirely new bonding process. This assures a highly effective, permanent junction . . . a bond that remains intact even under high temperatures. This bond appreciably enhances heat transfer from tube to fin.

Condenser Is Pure Copper or Copper Alloy—The Modine condenser is pure copper or copper alloy from the point where the steam enters to where it leaves in the form of condensate. All electrolysis troubles are thereby eliminated.

Condenser Has No Gaskets, Bolts or Screw Joints—The entire chain or series of steam and condensate carrying passages—supply and return bosses, tanks and condenser—are welded and brazed into a single structure paralleling the most modern method of ship armoring. There is not a single gasket, bolt or screw joint in the entire condenser.

Anti-Corrosive Metals in Condenser—Modine research conclusively demonstrated that impure water was responsible for condenser corrosion and consequent tube and tank leaks in many unit heaters. Modine engineers therefore, closely collaborated with metallurgists who were specialists in adapting metals to steam exposure. The result was the selection of copper and red-brass as the metals most resistant to the corrosive action of impure water. Another proof of Modine's built-in strength is the fact that these metals *and only these metals* go into the Modine condenser.

Modine Is a Light Weight Unit—While the Modine unit is stronger structurally, infinite care has been taken to retain the important feature of light weight. It has no heavy iron castings. Yet its sheet steel housing is heavy and rigid in construction, thus preventing the noisy vibration so often found with motor powered equipment.

NEED FOR BETTER PERFORMANCE

Modine research also demonstrated that unit heater performance could and should be improved. While unit heating was undeniably superior to other large space heating methods, there were questions to be settled in regard to the temperature of air coming from the unit heater, its volume and velocity, and its effective and economical distribution.

For instance, when a unit heater delivers air at unduly high temperature, the air rises quickly because of its buoyancy. Instead of reaching the zone where it is needed it concentrates near the roof, and heat loss at this point is excessive. But underheated air causes drafts as well as failing to provide proper warmth. Similarly, unless the air is delivered with sufficient velocity, it does not reach down into the area to be heated. If the velocity is too high, floor drafts and unhealthful working conditions result.

Modine engineers drew certain definite conclusions from these observations. They decided that to perform most satisfactorily, a unit heater must deliver a sufficient volume of air . . . at proper temperature and velocity . . . to the level where the heat is required.

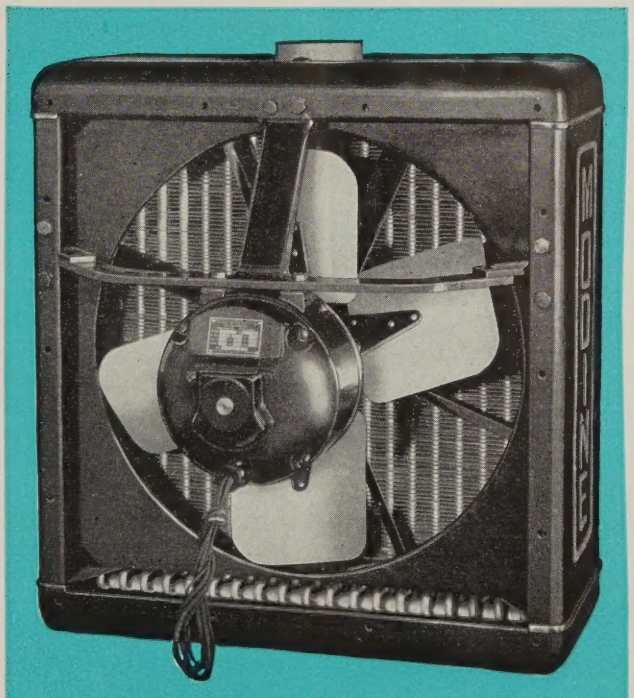
Finally, the air leaving the face of the heater must depart from it in a close-knit stream, free of eddies and swirls, so that its initial velocity will not be dissipated. This is necessary if the heated air is to carry a long distance and still be able to break through the cold air strata near the floor. Proper air temperature alone is not enough, nor large volume with it, nor high initial velocity. There must also be perfect straightness of the air stream at the outset.

MODINE OFFERS SUPERIOR PERFORMANCE

Modine engineers designed the Modine Unit Heater around these ideas. As a result the Modine unit is not only far better structurally, but its performance is also superior. The general design of the Modine condenser plus other air control features assures far more effective and economical distribution of heat.

Velocity Generators — Modine Unit Heaters are equipped with velocity generators to properly direct and control the stream of air leaving the heater . . . to give the greatest possible "throw" consistent with comfortable heating, yet keep power requirements at a minimum. Located directly behind the condenser, these velocity generators or "stationary fans" are made a part of the casing assembly.

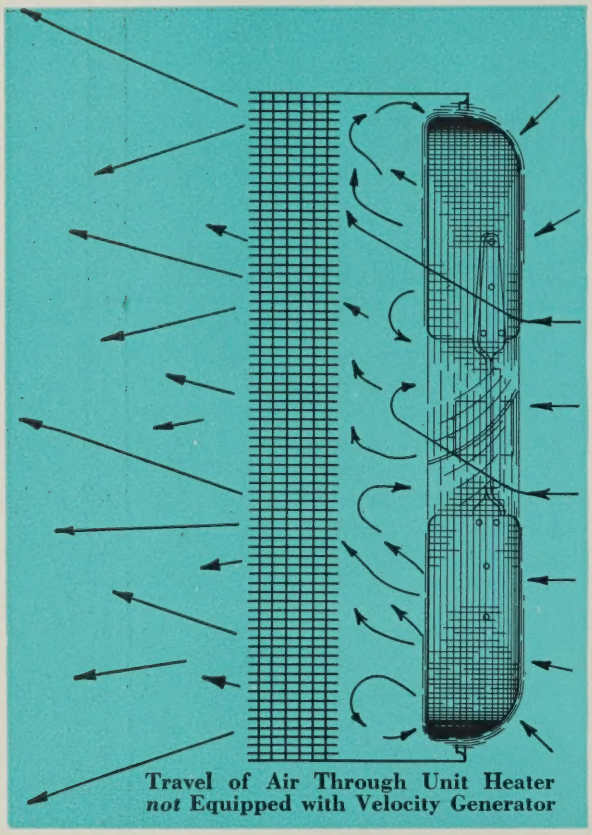
The purpose of the velocity generator is to collect the air as it leaves the fan and so sectionalize and direct it that the air is distributed equally over the entire area of the condenser. Thus the work of the condenser itself in controlling the air stream is minimized.



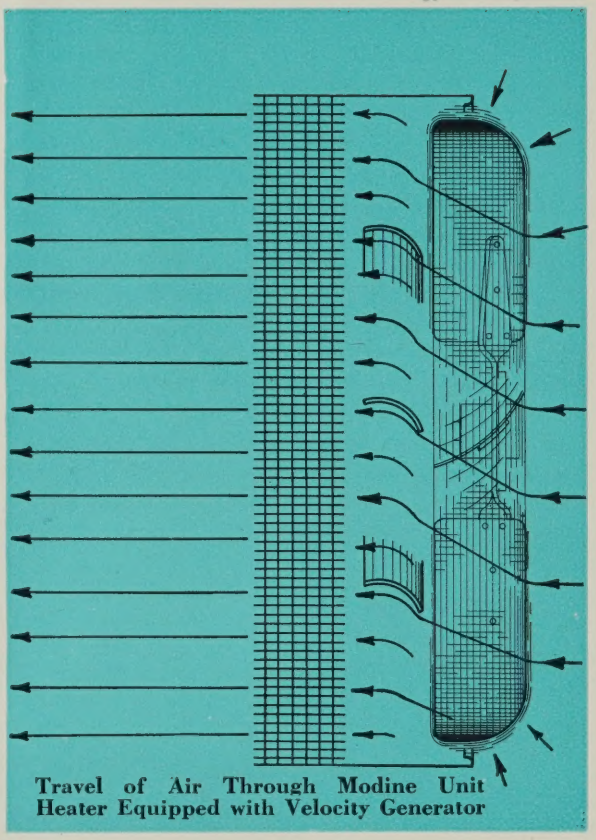
Rear View of Unit Showing Velocity Generator, Motor and Fan Assembly

The velocity generator promotes the delivery of a substantial volume of air which is not only properly tempered but has sufficient velocity. What is more important, it straightens the air stream leaving the heater. Thus the air stream maintains a large share of its initial velocity and hence retains the ability, even after traveling a long distance, to penetrate the cold air strata near the floor. Moreover, the velocity generator acts as a "super-charger," permitting the air to receive more heat from the condenser. The velocity generator is an exclusive Modine feature covered by patent application.

These velocity generators, formerly used on only the very large Modine units, are now standard equipment on all Modine Unit Heaters, except on Model 76 and Model 152.



Travel of Air Through Unit Heater *not* Equipped with Velocity Generator



Travel of Air Through Modine Unit Heater Equipped with Velocity Generator

Deflectors—All Modine units, as in the past, are equipped with re-adjustable, horizontal deflectors, attached to the face of the heater. The deflectors are of streamline design, with sufficient curvature to direct the air stream downward as it leaves the heater. Screws and spring clips, which permit easy re-adjustment of position, attach the deflectors to frame. These re-adjustable deflectors provide vertical direction of the air stream. Horizontal re-direction of the air stream is made possible by the exclusive Modine feature of direct pipe suspension. (See next page.)

Models 1545 and 2015 have twin air outlets and are equipped with deflectors of unusual design. Mounted on a double ring, each set of deflectors may easily be re-located so as to direct the air stream to the right, left, or straight forward. This feature provides a control of air direction which is at once simple and effective and which eliminates unsightly projecting nozzles.

Fans—Propeller type fans exclusively are used in the Modine units. Modine engineers consider this type superior to any other for handling the volume of air for which the units are designed—with low resistance and low power requirements. The fans are aluminum alloy.

All are accurately balanced with blades carefully pitched to ensure the handling of a maximum amount of air with a minimum of noise and of power cost.

Motors—Only motors of nationally known and accepted manufacture are employed on Modine Unit Heaters. *Every motor used has been especially designed for the unit which it serves.* Modine pioneered the full enclosure, the wool-packed bearing and the inverted mounting of motors on unit heaters. These features, which have proved their worth in many thousands of Modine Unit Heaters in field service, are all to be found in the Modine models. In addition, vibration-absorbing, rubber-mounted motors are being furnished as standard equipment on those of the smaller Modine Units, where noise resulting from ordinary motor vibration might be objectionable. These motors are so cradled in rubber that no vibration is carried from motor to motor bracket, or to the unit heater casing.

Wide Range of Sizes—The Modine Unit Heaters are offered in a wide range of steam and hot water sizes, from the Model 76, the equivalent of 76 sq. ft. of cast iron radiation, to the Model 2015, the equivalent of 2015 sq. ft. of cast iron radiation. Intermediate sizes have been selected to facilitate the economical application of Modine units to heating problems of every description. A photographic illustration of each unit, together with a dimensional diagram and performance data, will be found on pages 15, 16, 17, 18, 19, 20, 21, 22 and 23.

DIRECT PIPE SUSPENSION

The Modine Unit Heater was the first unit heater designed for direct suspension from the steam pipe line. This feature is fully protected by patents.

Easier Installation . . . Less Cost—Because they can be suspended directly from the steam line, Modine Unit Heaters are both easier and less expensive to install. Except for units larger than 1163, no brackets, pipe rods, or straps are necessary. Installation can be accomplished with less labor . . . and in quicker time . . . since the supply connection is the only support required, material costs are much less. The heating contractor should bear in mind that, in figuring a unit heater installation, his labor costs will be lower with Modine. The actual saving on installation amounts to from three to eight dollars, depending on the size of the unit, the number of units to be installed, etc.

A Safe Method of Installation—There can be no question as to the safety of suspending a Modine Unit Heater directly from the steam main without any support save the supply connection. Safety tests have conclusively shown that a two-inch pipe, of standard supply size, will safely carry the dead weight of *one hundred* Model 710 Modine Unit Heaters weighing 123 lbs. each.



Illustration Shows How Simply the Modine Unit Is Installed and How Easy It Is to Change Its Direction

360 Degree Rotatability—Modine direct suspension greatly facilitates re-direction of the heated air stream, permitting full 360 degree rotatability. For instance, a unit heater has been installed facing north. Changing conditions or new operations within the plant may make it desirable to have the air stream directed toward the south. To make this change with a Modine heater is merely a matter of loosening the supply and return connections, turning the unit about face, and tightening the connections.

Simplifies Re-Location—The Modine direct suspension feature simplifies re-location of the units. Taking a unit down and connecting it again in another part of the building is a simple job with a Modine unit as no supports, other than the pipe from which the heater is suspended, need to be installed.

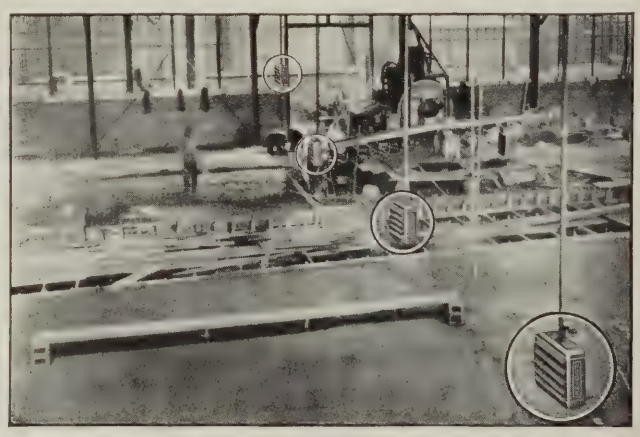
Special Applications

In addition to ideally answering the requirements for space heating and industrial drying (see pages 1 and 2), Modine Unit Heaters are most successfully used in a number of special applications.

In schools, churches, club and lodge meeting rooms, many times in garages where required by State Codes, positive introduction of fresh air is necessary. In such cases unit heaters are installed to introduce outside air which is warmed and delivered to the interior of the building. A by-pass damper is usually included in the duct work to permit admitting only outside air or mixing outside with room air or recirculating room air only. In these installations, Modine Unit Heaters equipped with low r.p.m. or variable speed motors may be used, thus securing even greater flexibility in their performance.

Unit Heaters often serve a ventilating as well as heating function in dairies to eliminate steam fog and to dry up wall and ceiling condensation; in steel plants to dissipate steam fog rising from pickling vats and for the correction of many noxious gas conditions in all kinds of factories.

The use of Modine Unit Heaters in these special applications frequently makes unnecessary the installation of complicated and expensive ventilating equipment.



Modine Units Replace Salamanders in Drying Concrete, also Provide Temporary Heat Economically During Building Construction

Other advantages of Modine Unit Heaters in ventilating applications are their quick heating, positive and effective heat distribution and the ease with which automatic temperature control can be adapted to them.



In this Dairy, Steam Fog Is Eliminated and More Healthful Heat Provided by Modine Unit Heaters

Cooling

The usefulness of the Modine unit is not confined to heating alone. It serves a dual purpose since it may be used for ventilating and cooling in warm weather. Cooling is accomplished in two ways. Merely operating the fan gives a good circulation of the room air. This is often done in offices, showrooms, etc., and accomplishes the same result as a desk or wall fan. Where a more positive temperature reduction is desired, cold water from city water supply may be used, or water pre-cooled by ice. Or an alcohol or similar anti-freeze mixture may be circulated through the unit, for heat-absorption purposes. In such cases Modine units designed for cooling-heating operation (Models 14, 23, 39 and 61), are recommended.

Refer to Modine Bulletin No. 437.

Locating Unit Heaters Properly

One of the most important principles to be observed in securing a satisfactory unit heater installation is proper location of the units. This is particularly true where a number of heaters are serving one large area.

In general, suspended type unit heaters should be placed or "spotted" to give a circular movement to all the air in a given area. To do this it is essential to place the units in tandem to each other, so that the air movement from the second unit which is, say 50 ft. to 100 ft. distant from the rear of the first unit, will assist the first unit to throw its delivered air a great distance. In applying the principle of tandem location care should be taken to avoid short-circuiting of heated air from one unit to another.

Generally the immediate adjacency of two units should be avoided whether one is blowing into the back of another or otherwise.

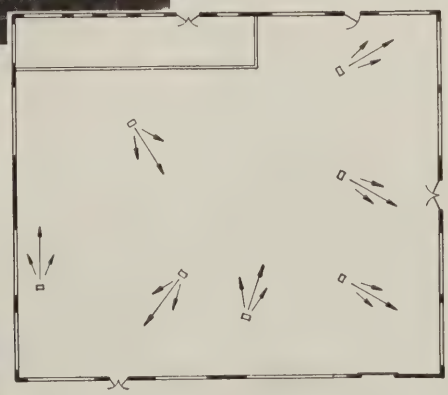
Units should be placed so as to wipe an exposed wall without blowing directly at it. An angle of approximately 30° between exposed wall and horizontal projection of the air stream has been found desirable.

As the height at which a unit heater is installed will have a direct bearing on the successful delivery of heated air through the working zone to the floor, reference should be made to the installation diagrams shown on Pages 15, 16, 17, 18, 19, 20, 21, 22 and 23. The installation heights recommended are the result of careful consideration of the velocity and temperature of the air delivered by each model.

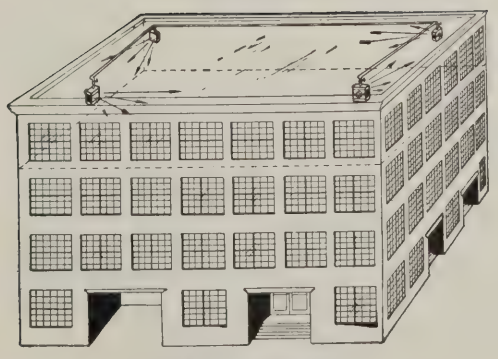


Factory

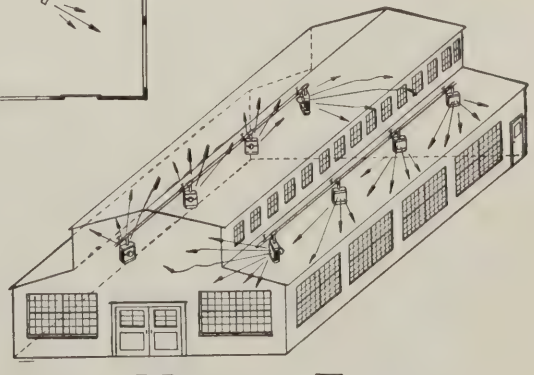
At left is shown a recommended layout for a typical saw tooth industrial building. Observe how the units have been spotted to secure thorough heat distribution over the entire floor area. Even though plant conditions should be changed after the heating installation has been made, Modine Unit Heaters, because of their patented feature of pipe-line suspension, can be either redirected by simply loosening unions in the supply and return lines, or very easily taken down and installed in new locations.



Saw Tooth Type

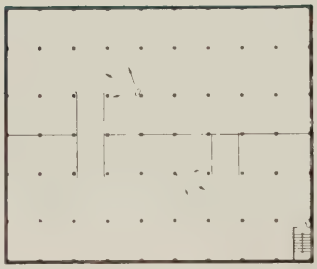


Mill Type



Monitor Type

Garage

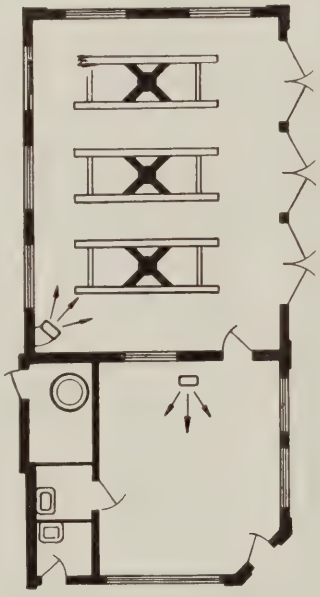


Unit heaters are the ideal equipment for all garages, including the ramp type. An illustration and diagram of a typical ramp garage installation appears at the right. Garage heating usually requires only sufficient heating capacity to maintain the storage area at a temperature of 40° to 50°. Modine Unit Heaters, with their feature of long distance heat throw, accomplish this purpose effectively and economically.



Service Station

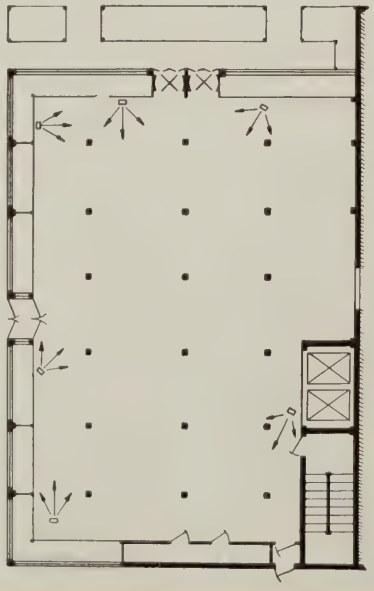
To the right are pictured two applications of Modine Units for service station heating—a small unit for maintaining a comfortable temperature in the office; a larger unit (shown on the heating layout) for providing a working temperature at the grease racks. Observe how in both cases the units have been located to warm up the cold air rushing in when doors are opened.





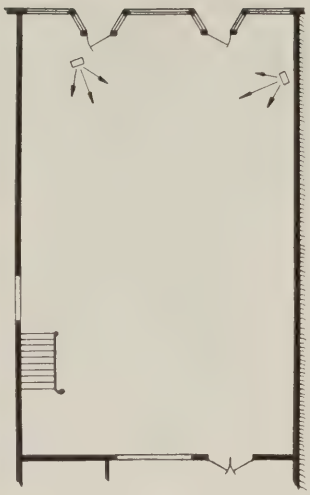
Department Store

One method of Modine Unit Heater installation in stores is illustrated at the right. The units, which have been mounted above shelving, are installed in recirculating ducts to permit air to be brought from the floor up to the units. These units are equipped with variable speed motors. The four floors of this department store are equipped with Modine Unit Heaters.



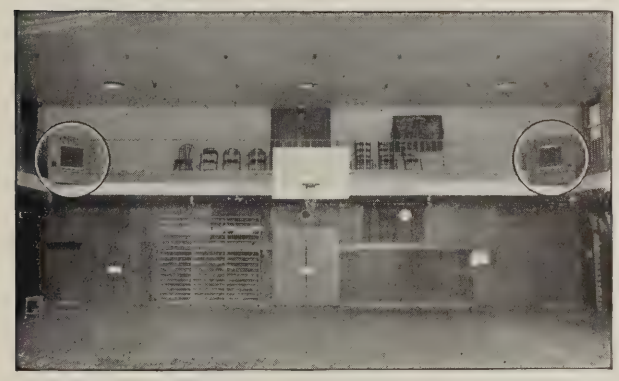


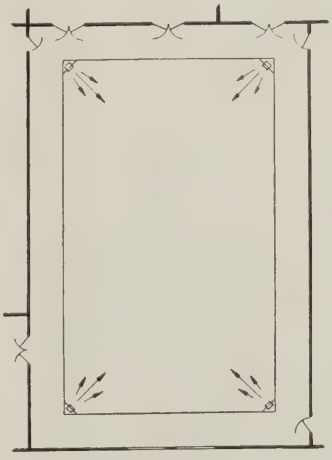




Small Store

Two Modine Units completely satisfy the heating requirements of this modern food shop. Their design harmonizes well with the general decorative treatment. Equipped with variable speed motors, they are operated at high speed before customers arrive, thus bringing the room quickly up to temperature even on the coldest days. During business hours, they operate at medium or low speed.





Gymnasium or Swimming Pool

No possibility of bodily contact with hot cast iron surfaces in this installation, shown at the left. Invaluable also in assembly hall, manual training room and locker room. One or more of the several units shown in this type of installation can be well employed to introduce and heat fresh air.



Recreation Room for Apartment or Home . . . . . .

With its chromium plating and smart black trim, the smallest size Modine Unit Heater, Model 76, is entirely in keeping with the appointments of any recreation room . . . in apartment or home. It has both the advantage of quick heating and extremely quiet operation, and is equipped with a two-speed motor.

Estimating Heat Requirements

Although it is appreciated that most heating engineers and contractors have authoritative data available for calculating heat losses, the method given below can serve as a means of checking results they secure. It will also be helpful to those not constantly dealing with heat loss calculations in estimating heating requirements and the approximate number and size of unit heaters necessary to answer those requirements.

Whenever a space heating problem is being considered, it is advisable to call in a Modine representative. Their experience in installing thousands of unit heaters is invaluable in the selection and location of Modine Unit Heaters as well as in planning an economical and permanently satisfactory unit heater installation.

Heat Loss Calculations

A—Determine the inside air temperature to be maintained during coldest weather.

B—Select a minimum outside temperature for design purposes based on local conditions. Usually taken as 10° above lowest recorded temperature for previous 10 years.

C—Tabulate net areas of glass, wall, floor and roof or ceiling exposed to outside temperature or to temperatures below those to be maintained, showing temperature difference.

D—Determine heat transmission coefficient for each of the above areas (glass, wall, etc.) based on actual building construction. (See any dependable table of heat transmission coefficients).

E—Compute transmission loss for each of the above areas. The loss for each area will be equal to the area multiplied by its temperature rise, multiplied by its transmission coefficient.

F—Determine the number of air changes per hour which may be expected to take place and calculate the heat required to raise this air from outside temperature to room temperature.

$$\text{B.t.u./Hr.} = \frac{\text{Cubic Contents} \times \text{Air Changes} \times \text{Temperature Rise}}{55}$$

G—The totals of transmission losses from "E" and air change losses from "F" will give the *total heat to be supplied. NOTE:* If processes performed in the building liberate a considerable quantity of heat, this should be determined as accurately as possible and subtracted from the heat required—(totals of "E" and "F").

If dust removal or other exhaust systems are used the air handled should be considered in determining air changes under F.

H—Select Modine Unit Heaters of such size and number that the total B.t.u. capacity of the Units equals the total of the calculated heat losses from the building.

Determining B.t.u. Capacities and Final Air Temperatures at *Medium* and *Low Speeds*

The B.t.u. per hour capacities given in the Tables on Pages 15 to 26 inclusive are for unit heaters equipped with constant speed motors. Below each Table are given the B.t.u. capacities at 2 lbs. steam, 60° entering air, and the air deliveries (c.f.m.) for these same units equipped with variable speed motors. Observe that the performance of the heater at *high speed* is the same as its performance at *constant speed,* as given in the Table.

To determine B.t.u. per hour capacities at *medium* and *low* speeds for steam pressures other than 2 lbs. and entering air temperatures other than 60°:

A—Divide the capacity for given speed at 2 lbs., 60° by the capacity for high speed at 2 lbs., 60°

B—Multiply the result by the high speed capacity at the desired pressure and entering air temperature.

To determine capacities at *medium* and *low* speeds of Hot Water Units, substitute "average water temperature at 170°" for "steam pressure of 2 lbs." in paragraph above.

To determine final air temperature:

A—Calculate air temperature rise by dividing the B.t.u. per hour figure determined above by 1.08, then divide the result by the unit heater's air delivery (c.f.m.).

B—Final air temperature will be the air temperature rise "A" plus the given entering air temperature.

Determining B.t.u. Capacities and Final Air Temperatures at Pressures (or Average Water Temperatures) and Entering Air Temperatures Not Given in the Capacity Tables

To determine the B.t.u. per hour capacity:

A—Find in the Capacity Table for the particular unit being considered its B.t.u. capacity at the pressure (or average water temperature) and entering air temperature nearest to those desired.

B—Determine the temperature difference between steam (or average water temperature) and entering air for "A."

C—Determine the temperature difference between steam (or average water temperature) and entering air for desired pressure and temperature.

D—Divide the B.t.u. capacity "A" by temperature difference "B" and multiply by temperature difference "C." The result is the hourly B.t.u. capacity of the unit heater under the desired conditions.

To determine final air temperature: Refer to paragraph above on this subject.

B.t.u. Required for Heating a Cubic Foot of Air

Initial Temp.	Final Temperature				
	40	*50*	*60*	*70*	*80*
–20	1.290	1.505	1.720	1.935	2.150
–10	1.051	1.262	1.473	1.684	1.892
0	0.822	1.028	1.234	1.439	1.645
10	0.604	0.805	1.007	1.208	1.409
20	0.393	0.590	0.787	0.984	1.181
30	0.192	0.385	0.578	0.770	0.963
40	0.000	0.188	0.376	0.564	0.752
50	0.000	0.000	0.184	0.367	0.551
60	0.000	0.000	0.000	0.179	0.359
70	0.000	0.000	0.000	0.000	0.175
Initial Temp.	*90*	*100*	*110*	*120*	*130*
–20	2.365	2.580	2.795	3.010	3.225
–10	2.102	2.311	2.522	2.732	2.943
0	1.851	2.056	2.262	2.467	2.673
10	1.611	1.812	2.013	2.215	2.416
20	1.378	1.575	1.771	1.968	2.165
30	1.155	1.345	1.540	1.733	1.925
40	0.940	1.128	1.316	1.504	1.692
50	0.735	0.918	1.102	1,286	1.470
60	0.538	0.718	0.897	1.077	1.256
70	0.350	0.525	0.700	0.875	1.049

Pipe Size Table

Based on 6000′ per minute velocity of steam. This corresponds to a pressure drop at 5# gauge initial pressure of .88# per 100′ for a 2″ pipe; .63# per 100′ for a 4″ pipe; .47# per 100′ for an 8″ pipe.

For reasons of piping convenience (branches to Units) it is recommended that supply piping be held to the size of the inlet tapping even though a smaller size would have sufficient steam capacity.

Pounds of *Steam Condensed* Per Hour	*5* lbs. Steam Press.			*20* lbs.		*40* lbs.		*100* lbs.	
	Supply Pipe Inches	*Gravity Return* Inches	*Vacuum Return* Inches	*Supply Pipe* Inches	*Gravity Return* Inches	*Supply Pipe* Inches	*Gravity Return* Inches	*Supply Pipe* Inches	*Gravity Return* Inches
50	¾	½	½	½	½	½	½	½	½
100	1	¾	½	¾	¾	¾	¾	¾	¾
150	1-¼	1	¾	1	1	1	1	¾	1
200	1-½	1-¼	¾	1-¼	1-¼	1	1-¼	1	1-¼
400	2	1-¼	¾	1-½	1-¼	1-¼	1-¼	1	1-¼
600	2-½	1-½	1	2	1-½	1-½	1-½	1-¼	1-½
800	3	2	1-¼	2-½	2	2	2	1-¼	2
1000	3-½	2	1-¼	2-½	2	2	2	1-½	2
1200	3-½	2	1-¼	3	2	2-½	2	1-½	2
1600	4	2-½	1-½	3	2-½	2-½	2-½	2	2-½
2200	5	3	2	3-½	3	3	3	2-½	3
2600	5	3	2	4	3	3-½	3	2-½	3
3200	6	3-½	2-½	4-½	3-½	3-½	3-½	2-½	3-½
3600	6	3-½	2-½	5	3-½	4	3-½	3	3-½
4200	7	4	3	5	4	4	4	3	4
4800	7	4	3	6	4	5	4	3-½	4
6500	8	4	3-½	7	4	5	4	4	4
8000	9	5	3-½	7	5	6	5	4	5
9000	10	5	4	8	5	6	5	4	5
10000	10	5	4	8	5	7	5	5	5
14000	12	6	5	9	6	8	6	6	6

The above table is based on the formula $p = 0.000131 \left(1 + \frac{3.6}{d}\right) \frac{W^2 L}{D d^5}$

Where p = pressure drop in pounds per square inch. d = internal diameter of pipe in inches. w = pounds of steam flowing per minute. D = mean of initial and final densities of steam in pounds per cubic foot. L = length of pipe in feet.

Properties of Saturated Steam

From Marks & Davis Tables

By Permission of Longmans Green & Co.

Gage Pressure Lbs. per Sq. in.	*Temperature* Degrees F.	*Latent Heat* Btu. per Lb.	*Specific Volume* Cu. ft. per Lb.	*Gage Pressure* Lbs. per Sq. in.	*Temperature* Degrees F.	*Latent Heat* Btu. per Lb.	*Specific Volume* Cu. ft. per Lb.	*Gage Pressure* Lbs. per Sq. in.	*Temperature* Degrees F.	*Latent Heat* Btu. per Lb.	*Specific Volume* Cu. ft. per Lb.
0	212.0	970.4	26.79	44	291.3	915.9	7.32	90	331.2	885.4	4.241
2	218.5	966.2	23.80	46	293.5	914.3	7.09	92	332.5	884.3	4.166
4	224.4	962.4	21.36	48	295.6	912.7	6.88	94	333.9	883.2	4.093
5	227.2	960.6	20.38	50	297.7	911.2	6.68	96	335.2	882.1	4.023
6	229.8	958.8	19.45	52	299.7	909.7	6.50	98	336.6	881.1	3.955
8	234.8	955.6	17.85	54	301.7	908.2	6.32	100	337.9	880.0	3.890
10	239.4	952.5	16.49	56	303.6	906.7	6.14	103	339.8	878.5	3.795
12	243.7	949.6	15.34	58	305.5	905.3	5.98	106	341.7	876.9	3.706
14	247.8	946.8	14.33	60	307.3	903.9	5.83	109	343.6	875.4	3.619
16	251.6	944.2	13.45	62	309.1	902.5	5.69	112	345.4	873.9	3.538
18	255.3	941.7	12.68	64	310.9	901.2	5.56	115	347.2	872.5	3.460
20	258.8	939.3	11.99	66	312.6	899.9	5.43	118	348.9	871.0	3.385
22	262.1	936.9	11.38	68	314.4	898.6	5.30	121	350.7	869.6	3.315
24	265.3	934.7	10.82	70	316.0	897.3	5.18	124	352.4	868.2	3.248
26	268.3	932.5	10.32	72	317.7	896.0	5.07	127	354.0	866.9	3.182
28	271.3	930.5	9.87	74	319.3	894.8	4.96	130	355.7	865.5	3.118
30	274.1	928.5	9.45	76	320.9	893.5	4.86	133	357.3	864.1	3.058
32	276.8	926.6	9.07	78	322.4	892.3	4.76	136	358.9	862.9	2.999
34	279.4	924.7	8.72	80	323.9	891.1	4.66	139	360.4	861.5	2.943
36	281.9	922.9	8.40	82	325.4	889.9	4.57	142	362.0	860.3	2.890
38	284.3	921.1	8.10	84	326.9	888.8	4.48	145	363.5	859.0	2.839
40	286.7	919.3	7.82	86	328.4	887.6	4.40	148	365.0	857.7	2.790
42	289.0	917.6	7.56	88	329.8	886.5	4.32	150	365.9	856.9	2.758

Capacities — Dimensions — Auxiliary Data

MODINE
STEAM TYPE UNIT HEATERS

On this and following pages is complete information essential to the proper selection, application and installation of Modine Unit Heaters. In addition to an actual photograph, a B.t.u. capacity table and a combination dimension and installation diagram is given for each size of Modine steam-type unit heater. Furthermore, each unit has likewise been classified with reference to its most popular applications.

It should be noted that the installation-dimension diagrams are entirely typical of Modine Unit Heater installations on various types of heating systems. For example, the diagram for the Model 275 unit shows a gravity steam installation; the diagram for the Model 793-W (see page 26) shows a typical installation of a Modine hot water type unit. Other diagrams illustrate two-pipe vacuum or vapor installations. In short, all models of Modine steam-type Unit Heaters are applicable to gravity, vacuum or vapor steam heating systems; all models of Modine hot water-type Unit Heaters to gravity or forced hot water heating systems.

Modine Unit Heaters are rated in accordance with the standard test code adopted by the Industrial Unit Heater Association and the American Society of Heating and Ventilating Engineers. All Modine Unit Heaters except Model 76 are guaranteed for operation on 150 lbs. steam pressure. The Model 76 is guaranteed for 50 lbs. B.t.u. capacities are based on 60 cycle and D.C. motor operation.

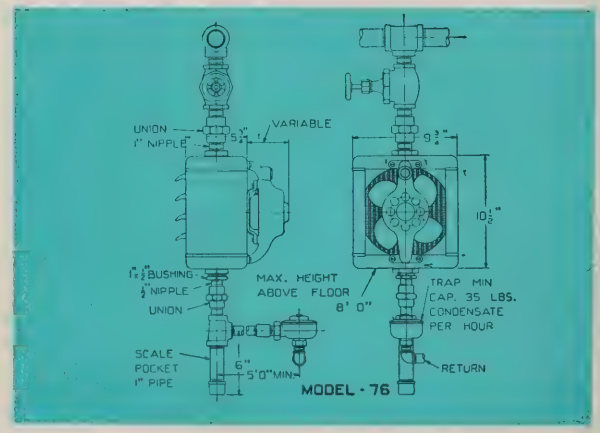
STEAM CAPACITIES AND AUXILIARY DATA STEAM

MODEL 76



B.t.u. delivery at 2 lbs. steam, 60° entering air 18,240; equivalent in direct radiation 76; c.f.m. 194; face velocity 537; motor hp. 6 watts (output); r.p.m. 1550. Weight 25 lbs.

Applications: Its chromium-plated exterior makes Model 76 the smartest, trimmest looking heater in the line. Ideally applied to residential recreation rooms, small offices and other areas of limited size where appearance as well as quick heating are important factors. Available with single or two-speed motors.

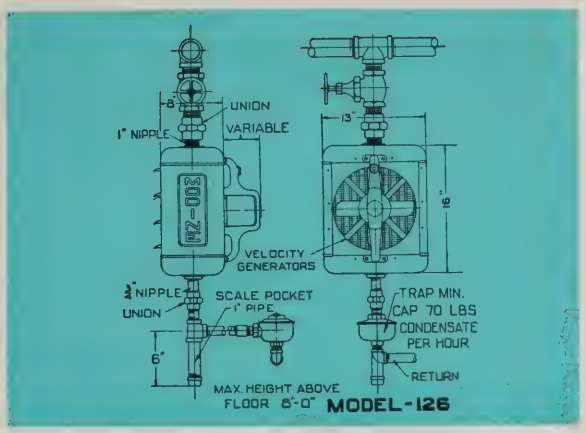


Model 76	Steam Press. Lbs. Sq. In. Gauge	0			2			5			10			25			50		
	Steam Temp. ° Fahr.	212			218.5			227			239			267			298		
Capacity — 18,240 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 800 Btu per hour. Replaces 76 sq. ft. cast iron radiation. *Air Delivery—194* cfm at standard air conditions. 537 fpm. *Motor*—6 watts; (output) 1550 rpm in 60 cycle and D.C. Operating watts 30. *Fan*—Brake hp .008; Dia. 8". *Tappings*—Supply 1"; Return 1". *Dimensions*—See Diagram. *Weight*—Net 25 lbs.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out Air ° F.
	0							26,050	27.1	108	27,450	28.8	113	30,700	32.9	127	34,220	37.6	141
	30				21,650	22.4	125	22,650	23.6	130	24,000	25.2	136	27,200	29.2	150	30,800	33.8	165
	50	18,610	19.2	135	19,370	20.0	138	20,350	21.2	143	21,700	22.8	149	24,950	26.8	164	28,500	31.3	180
	60	17,480	18.0	142	18,240	18.9	145	19,200	20.0	150	20,550	21.6	156	23,800	25.5	171	27,350	30.0	188
	70	16,310	16.8	148	17,080	17.7	151	18,050	18.8	156	19,400	20.4	162	22,650	24.3	178	26,200	28.8	195
	100	12,880	13.3	165	13,620	14.1	169	14,600	15.2	173	15,980	16.8	180	19,200	20.6	196	22,750	25.0	214

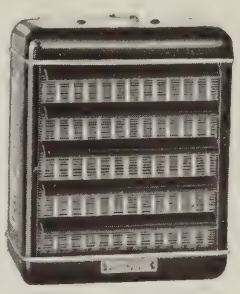
See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

VARIABLE SPEED DATA Model 76 is also available with two-speed A.C. motor. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at the respective speeds are as follows:

	High Speed 1550 R.p.m.	Low Speed 1200 R.p.m.
Cap. (B.t.u.)	18,240	16,300
Air Del. (c.f.m.)	194	168



MODEL 126



B.t.u. delivery at 2 lbs. steam, 60° entering air 30,300; equivalent in direct radiation 126; c.f.m. 456; face velocity 575; motor hp. 1/40; r.p.m. 1590. Weight 45 lbs.

Applications: A wide market has evidenced itself for a unit heater of this capacity. The Model 126 is ideal for small offices, storerooms, wash rooms and other restricted areas. It is available with single, two or three-speed motors.

Model 126	*Steam Press.* Lbs. Sq. In. Gauge	0			2			5			10			25			50			100			150		
	Steam Temp. ° Fahr		212		218.5			227			239			267			298			338			366		
Capacity—30,300 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 1750 Btu per hour. Replaces 126 sq. ft. cast iron radiation.	Temp. *Entering Air* ° Fahr.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr	*Out. Air* ° F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr	*Out. Air* ° F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr	*Out. Air* ° F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.
Air Delivery—456 cfm at standard air conditions. 575 fpm.																									
Motor—1/40 hp., 1590 rpm in 60 cycles or D.C. Operating watts 70.	*0*							43,400	45	76	45,700	48	80	51,100	55	90	57,000	63	100	64,600	74	113	70,000	82	123
Fan—Brake hp .033; Dia. 10"	*30*				36,000	37	98	37,650	39	101	39,950	42	105	45,300	49	115	51,200	56	126	58,900	67	140	64,200	75	150
Tappings—Supply 1"; Return ¾".	*50*	30,950	32	110	32,200	33	113	33,850	35	116	36,100	38	120	41,500	45	131	47,400	52	143	55,000	63	157	60,400	70	168
Dimensions—See Diagram	*60*	29,050	30	118	30,300	31	120	31,900	33	123	34,200	36	128	39,600	43	139	45,500	50	150	53,100	61	165	58,500	68	176
Weight—Net 45 lbs.	*70*	27,150	28	125	28,400	29	127	30,000	31	131	32,300	34	135	37,650	40	146	43,600	48	158	51,200	58	174	56,600	66	185
	100	21,400	22	146	22,650	24	149	24,250	26	152	26,550	28	157	31,900	34	168	37,850	42	181	45,500	52	197	50,850	59	211

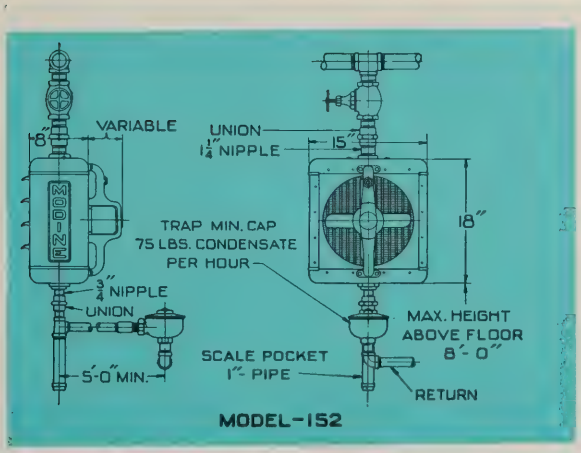
See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

VARIABLE SPEED DATA

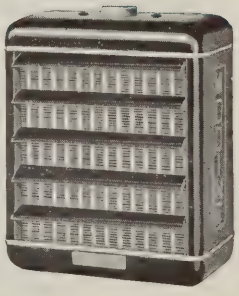
Model 126 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1590 R.p.m.	Medium Speed 1350 R.p.m.	Low Speed 1000 R.p.m.
Cap. (B.t.u.)	30,300	28,100	23,500
Air Del. (c.f.m.)	456	422	340

STEAM CAPACITIES AND AUXILIARY DATA STEAM



MODEL 152



B.t.u. delivery, at 2 lbs. steam, 60° entering air 36,500; equivalent in direct radiation 152; c.f.m. 540; face velocity 505; motor hp. 1/40; r.p.m. 1590. Weight 57 lbs.

Applications: Due to its comparatively small size this model is particularly suitable for gasoline filling stations, offices, stock rooms and other areas of moderate size. Available with single, two or three-speed motors.

Model 152	*Steam Press.* Lbs. Sq. In. Gauge	0			2			5			10			25			50			100			150		
	Steam Temp. ° Fahr.		212		218.5			227			239			267			298			338			366		
Capacity—36,500 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 2400 Btu per hour. Replaces 152 sq. ft. cast iron radiation.	Temp. *Entering Air* ° Fahr.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.
Air Delivery—540 cfm at standard air conditions. 505 fpm.																									
Motor—1/40 hp. 1590 rpm in 60 cycle or D.C. Operating watts 65.	*0*							52,300	54.4	78	55,000	57.8	82	61,500	65.8	91	68,600	75.4	102	77,900	88.6	116	84,300	98.5	125
Fan—Brake hp .026; Dia. 12".	*30*				43,400	45.2	99	45,400	47.3	102	48,200	50.6	106	54,600	58.5	116	61,700	67.7	128	71,000	80.7	142	77,400	90.4	152
Tappings—Supply 1¼"; Return 1¼"	*50*	37,300	38.4	111	38,800	40.4	114	40,800	42.5	117	43,500	45.6	122	50,000	53.6	132	57,100	62.7	144	66,300	75.4	159	72,800	85.1	170
Dimensions—See Diagram.	*60*	35,000	36.0	119	36,500	38.0	121	38,500	40.0	125	41,200	43.2	129	47,600	51.0	140	54,800	60.1	152	64,000	72.8	167	70,500	82.3	178
Weight—Net 57 lbs.	*70*	32,500	33.5	125	34,200	35.6	128	36,200	37.7	132	38,900	40.8	136	45,400	48.6	147	52,500	57.6	159	61,700	70.2	176	68,200	79.7	187
	100	25,800	26.6	146	27,300	28.4	149	29,200	30.4	153	32,000	33.6	158	38,500	41.2	169	45,600	50.0	182	54,800	62.3	199	61,300	71.6	211

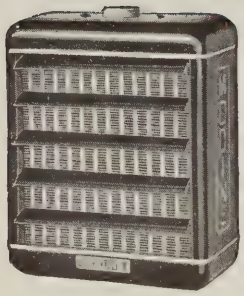
See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

VARIABLE SPEED DATA

Model 152 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

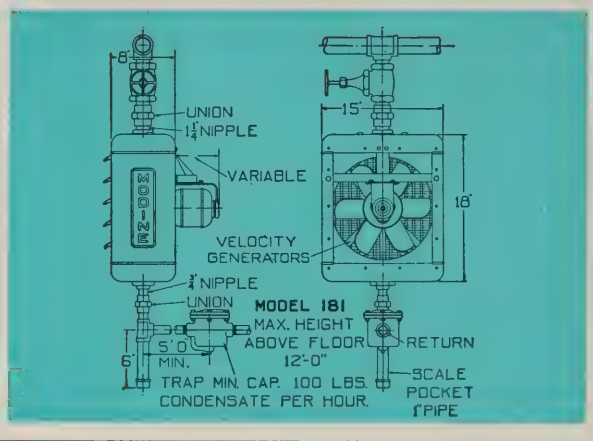
	High Speed 1590 R.p.m.	Medium Speed 1350 R.p.m.	Low Speed 1000 R.p.m.
Cap. (B.t.u.)	36,500	32,500	26,800
Air Del. (c.f.m.)	540	475	365

MODEL 181



B.t.u. delivery at 2 lbs. steam, 60° entering air 43,500; equivalent in direct radiation 181; c.f.m. 770; face velocity 690; motor hp. 1/20; r.p.m. 1140. Weight 64 lbs.

Applications: The Model 181 unit has much the same applications as the Model 152 with the exception that it is equipped with low speed, rubber-mounted motor. This unit is one of several recent additions to the Modine line. Available with single, two or three-speed motors.



Model 181	*Steam Press.* Lbs. Sq. In. Gauge	0			2			5			10			25			50			100			150		
	Steam Temp. ° Fahr			212			218.5			227			239			267			298			338			366		
Capacity—43,500 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 2400 Btu per hour. Replaces 181 sq. ft. cast iron radiation. *Air Delivery*—770 cfm at standard air conditions. 690 fpm. *Motor*—1/20 hp., 1140 rpm in 60 cycles or D.C. Operating watts 77. *Fan*—Brake hp .05; Dia. 12". *Tappings*—Supply 1¼"; Return ¾". *Dimensions*—See Diagram. *Weight*—Net 64 lbs.	Temp. *Entering Air* ° Fahr	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr	*Out. Air* ° F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr	*Out. Air* ° F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.
	0	.....	.....	.....	.....	.....	.....	62,300	65	65	65,600	69	69	73,300	79	77	81,750	90	85	92,700	106	97	100,900	117	105
	30	.....	.....	.....	51,700	54	88	54,000	56	90	57,400	60	94	65,000	70	103	73,500	81	112	84,500	96	124	92,200	108	133
	50	44,500	46	102	46,250	48	104	48,500	51	106	51,900	55	110	59,500	64	119	68,000	75	129	79,000	90	142	86,700	101	151
	60	41,700	43	109	43,500	45	111	45,880	48	115	49,100	52	118	56,800	61	127	65,300	72	137	76,300	87	150	84,000	98	159
	70	39,000	40	117	40,800	42	119	43,050	45	122	46,400	49	126	54,000	58	135	62,600	69	145	73,500	84	159	81,200	95	168
	100	30,750	32	139	32,500	34	141	34,850	36	144	38,150	40	149	45,850	49	158	54,400	60	169	65,300	74	183	73,000	85	193

See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

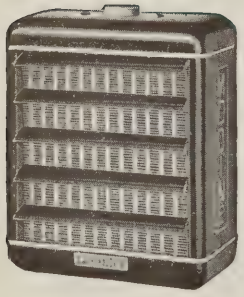
VARIABLE SPEED DATA

Model 181 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1140 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	43,500	35,700	28,000
Air Del. (c.f.m.)	770	552	375

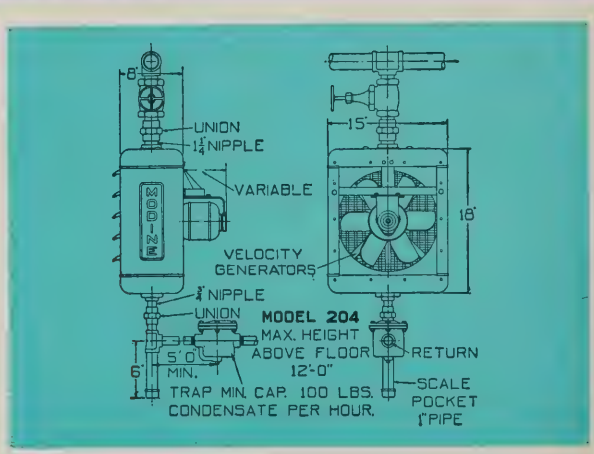
STEAM CAPACITIES AND AUXILIARY DATA STEAM

MODEL 204



B.t.u. delivery, at 2 lbs. steam, 60° entering air 49,000; equivalent in direct radiation 204; c.f.m. 735; face velocity 673; motor hp. 1/20; r.p.m. 1140. Weight 69 lbs.

Applications: This small, low speed, quietly operating unit has many applications. Equipped with a vibration-absorbing, rubber-mounted motor, Model 204 is particularly recommended for rooms where quietness of operation is essential. Available with single, two or three-speed motor.



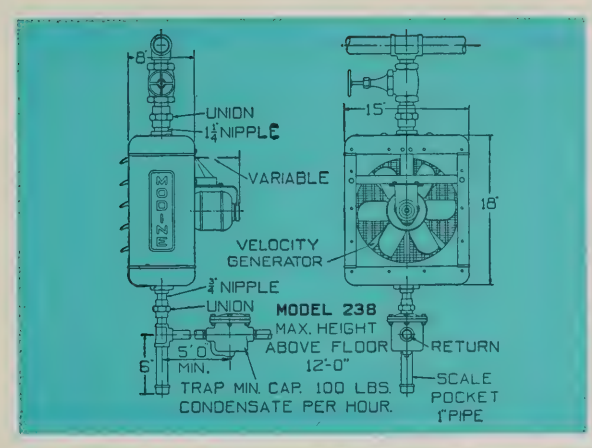
Model 204	*Steam Press.* Lbs. Sq. In. Gauge	0			2			5			10			25			50			100			150		
	Steam Temp. ° Fahr.			212			218.5			227			239			267			298			338			366		
Capacity—49,000 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 2400 Btu per hour. Replaces 204 sq. ft. cast iron radiation. *Air Delivery*—735 cfm at standard air conditions. 673 fpm. *Motor*—1/20 hp., 1140 rpm in 60 cycle or D.C. Operating watts 80. *Fan*—Brake hp .05; Dia. 12" *Tappings*—Supply 1¼"; Return ¾" *Dimensions*—See Diagram. *Weight*—Net 69 lbs.	Temp. *Entering Air* ° Fahr.	*Heat Del.* B.T.U. per Hr	*C'd-sate* #per Hr	*Out. Air* ° F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.
	0	.....	.....	.....	.....	.....	.....	70,200	73	77	73,900	78	81	82,500	88	90	92,100	101	101	104,400	119	114	113,000	132	124
	30	.....	.....	.....	58,250	60	98	60,900	63	101	64,600	68	105	73,250	79	115	82,900	91	126	95,200	108	141	103,800	121	151
	50	50,100	52	111	52,000	54	113	54,700	57	116	58,400	61	121	67,100	72	131	76,700	84	143	89,000	101	158	97,700	114	169
	60	47,000	49	118	49,000	51	120	51,600	54	124	55,300	58	128	64,000	69	139	73,600	81	151	86,000	98	166	94,600	111	177
	70	43,900	45	125	45,900	48	128	48,500	51	131	52,250	55	136	60,900	65	147	70,500	77	159	82,900	94	174	91,500	107	185
	100	34,600	36	146	36,650	38	149	39,300	41	152	43,000	45	157	51,600	55	169	61,200	67	181	73,600	84	198	82,250	96	209

See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

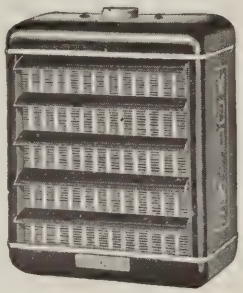
VARIABLE SPEED DATA

Model 204 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1140 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	49,000	39,700	30,900
Air Del. (c.f.m.)	735	585	420



MODEL 238



B.t.u. delivery at 2 lbs. steam, 60° entering air 57,200; equivalent in direct radiation 238; c.f.m. 731; face velocity 690; motor hp. 1/20; r.p.m. 1140. Weight 78 lbs.

Applications: Quiet in operation, this unit is often used in small stores, offices, school rooms and other areas too large to be handled effectively by the Model 204. Available with single, two or three-speed motors, all rubber mounted.

Model 238	*Steam Press.* Lbs. Sq. In. Gauge	0		2			½			10			25			50			100			150		
	Steam Temp. ° Fahr.		212	218.5			227			239			267			298			338			366		
Capacity—57,200 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 2400 Btu per hour. Replaces 238 sq. ft. cast iron radiation. *Air Delivery*—*731* cfm at standard air conditions. 690 fpm. *Motor*—1/20 hp, 1140 rpm in 60 cycle or D.C. Operating watts 76. *Fan*—Brake hp. .050; Dia. 12". *Tappings*—Supply 1¼"; Return ¾". *Dimensions*—See Diagram. *Weight*—Net 78 lbs.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.
	0						82,000	85	90	86,300	91	95	96,500	103	106	107,500	118	118	122,000	139	134	132,100	154	146
	30				68,000	70	110	71,100	74	113	75,500	79	118	85,500	92	130	96,750	106	143	111,100	126	160	121,200	142	172
	50	58,500	60	121	60,900	63	124	63,900	67	128	68,200	72	133	78,300	85	145	89,500	98	159	103,900	118	176	114,100	133	189
	60	54,850	57	128	57,200	59	131	60,250	63	135	64,600	68	140	74,700	80	153	85,900	94	167	100,200	114	185	110,400	129	197
	70	51,200	53	135	53,600	56	138	56,600	59	142	61,000	64	148	71,100	76	161	82,300	90	175	96,750	110	193	106,800	125	205
	100	40,400	42	154	42,800	44	157	45,850	48	162	50,100	53	167	60,250	65	181	71,500	79	196	85,900	98	215	96,000	112	229

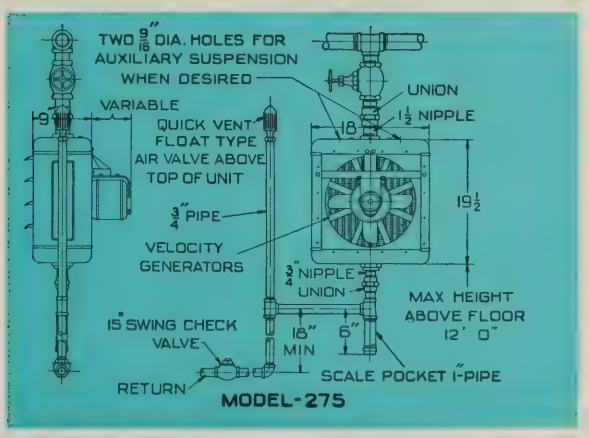
See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures

VARIABLE SPEED DATA

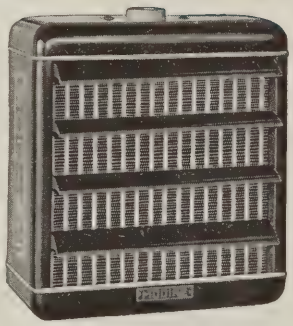
Model 238 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1140 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	57,200	47,400	35,200
Air Del. (c.f.m.)	731	531	358

STEAM CAPACITIES AND AUXILIARY DATA STEAM



MODEL 275



B.t.u. delivery, at 2 lbs. steam, 60° entering air 66,000; equivalent in direct radiation 275; c.f.m. 1052; face velocity 687; motor hp. 1/10; r.p.m. 1140. Weight 81 lbs.

Applications: The Model 275 has sufficient capacity to be used in industrial applications as well as in stores, large offices and other spaces where a quietly operating heater is needed. This unit is likewise provided with rubber mounted, low speed motor. Available with single, two or three-speed motor.

Model 275	*Steam Press.* Lbs. Sq. In. Gauge	0		2			5			10			25			50			100			150		
	Steam Temp. ° Fahr.		212	218.5			227			239			267			298			338			366		
Capacity—66,000 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 3400 Btu per hour. Replaces 275 sq. ft. cast iron radiation. *Air Delivery*—*1052* cfm at standard air conditions. 687 fpm. *Motor*—1/10 hp., 1140 rpm in 60 cycle or D.C. Operating watts 150. *Fan*—Brake hp .067. Dia. 13". *Tappings*—Supply 1½"; Return ¾". *Dimensions*—See Diagram. *Weight*—Net 81 lbs.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.
	0						94,600	99	72	99,600	105	76	111,100	119	85	124,100	136	96	140,800	160	108	152,300	178	116
	30				78,500	81	94	82,000	85	97	87,000	91	101	98,700	105	110	111,700	122	121	128,300	146	135	139,800	163	144
	50	67,400	69	107	70,100	73	110	73,700	77	113	78,700	83	117	90,400	97	127	103,200	133	138	119,800	136	152	131,600	153	162
	60	63,250	65	115	66,000	68	117	69,500	72	120	74,500	78	124	86,200	92	135	99,100	109	146	115,800	132	160	127,300	149	170
	70	59,100	61	121	61,800	64	124	65,400	68	128	70,400	74	132	82,000	88	142	95,000	104	154	111,500	127	168	123,200	144	178
	100	46,600	48	143	49,300	51	146	52,900	55	149	57,900	61	154	69,500	74	165	82,400	91	177	99,100	113	192	110,800	129	203

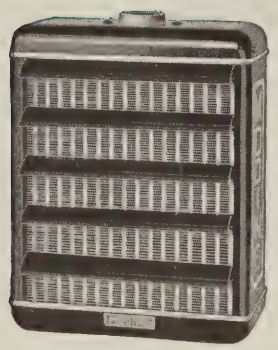
See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

VARIABLE SPEED DATA

Model 275 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

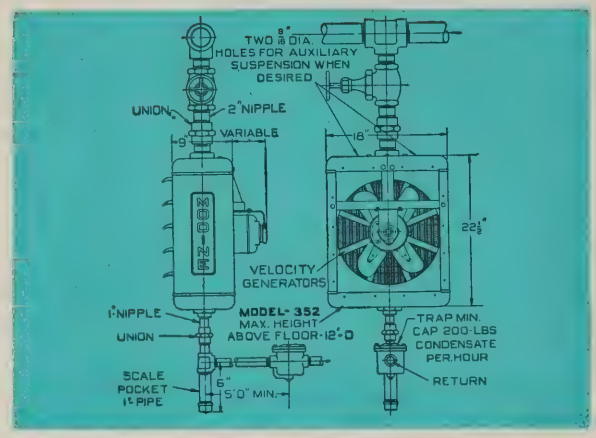
	High Speed 1140 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	66,000	54,700	43,200
Air Del. (c.f.m.)	1,052	783	558

MODEL 352



B.t.u. delivery, at 2 lbs. steam, 60° entering air 84,700; equivalent in direct radiation 352; c.f.m. 1425; face velocity 752; motor hp. 1/10; r.p.m. 1140. Weight 88 lbs.

Applications: Although still classed among the smaller units, the Model 352 gives unusually thorough heat distribution. A good industrial unit, it is also very effective for sales and showrooms (and quiet, too, because its motor is cradled in rubber). Available with single, two or three-speed motors.



Model 352	Steam Press. Lbs. Sq. In. Gauge	0			2			5			10			25			50			100			150		
	Steam Temp. ° Fahr.	212			218.5			227			239			267			298			338			366		
Capacity—84,700 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 4100 Btu per hour. Replaces 352 sq. ft. cast iron radiation.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.
Air Delivery—*1425* cfm at standard air conditions. 752 fpm.																									
Motor—1/10 hp, 1140 rpm in 60 cycle or D.C. Operating watts 190.	*0*							121,200	126	65	127,700	134	69	143,700	154	77	159,100	179	86	180,500	205	97	195,400	228	105
Fan—Brake hp .130. Dia. 15".	*30*				100,800	104	91	105,200	110	93	111,700	117	97	126,600	136	106	143,200	157	116	164,500	187	129	179,300	209	138
Tappings—Supply 2"; Return 1".	*50*	86,600	89	104	90,000	93	106	94,550	99	109	101,000	106	113	115,900	124	123	132,400	145	133	153,800	175	144	168,800	197	156
Dimensions—See Diagram.	*60*	81,200	84	111	84,700	88	114	89,250	93	117	95,700	101	121	110,700	118	131	127,100	140	141	148,500	169	155	163,400	191	164
Weight—Net 88 lbs.	*70*	75,900	78	119	79,400	82	122	83,900	87	124	90,300	95	129	105,200	113	138	121,800	134	149	143,200	163	163	158,100	185	173
	100	59,900	62	141	63,400	66	144	67,900	73	147	74,250	78	151	89,250	96	161	105,800	116	173	127,100	145	187	142,100	166	198

See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

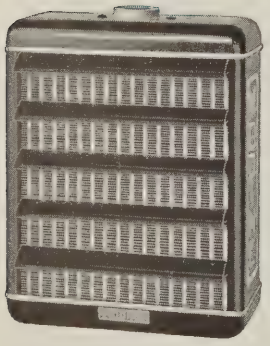
VARIABLE SPEED DATA

Model 352 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1140 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	84,700	70,600	54,000
Air Del. (c.f.m.)	1,425	1,037	690

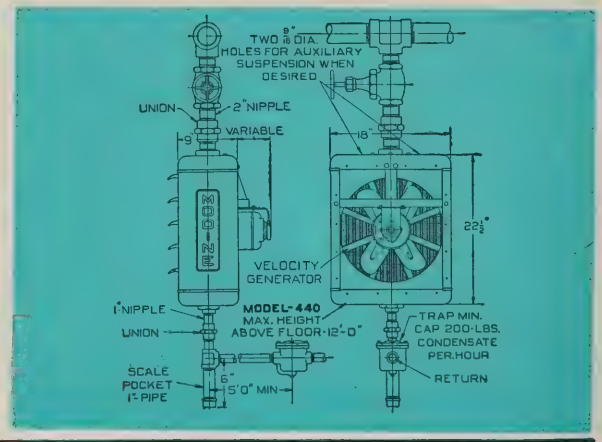
STEAM CAPACITIES AND AUXILIARY DATA STEAM

MODEL 440



B.t.u. delivery at 2 lbs. steam, 60° entering air 105,600; equivalent in direct radiation 440; c.f.m. 1320; face velocity 745; motor hp. 1/10; r.p.m. 1140. Weight 99 lbs.

Applications: The Model 440, another low speed unit with rubber-mounted motor, is applicable in the commercial (stores, showrooms, etc.) as well as the industrial field. Available with single, two or three-speed motors.



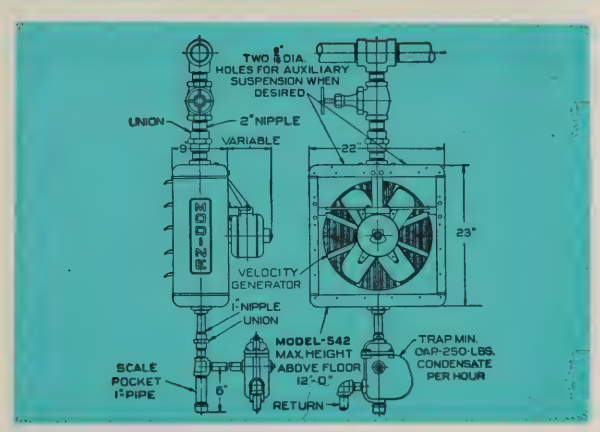
Model 440	Steam Press. Lbs. Sq. In. Gauge	0			2			5			10			25			50			100			150		
	Steam Temp. ° Fahr.	212			218.5			227			239			267			298			338			366		
Capacity—105,600 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 4100 Btu per hour. Replaces 440 sq. ft. cast iron radiation.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.
Air Delivery—*1320* cfm at standard air conditions. 745 fpm.																									
Motor—1/10 hp, 1140 rpm in 60 cycle or D.C. Operating watts 185.	*0*							151,100	157	92	159,300	167	97	178,000	191	108	198,500	218	121	225,000	256	137	243,700	284	148
Fan—Brake hp. 130; Dia. 15".	*30*				125,500	130	112	131,200	137	115	139,200	146	120	158,000	169	133	178,500	196	146	205,000	233	163	223,700	261	175
Tappings—Supply 2"; Return 1".	*50*	107,900	111	123	112,200	116	126	117,900	123	129	125,900	132	135	144,600	155	148	165,200	181	161	191,800	218	179	210,500	246	192
Dimensions—See Diagram.	*60*	101,200	104	130	105,600	109	133	111,200	116	137	119,200	125	142	138,000	148	155	158,500	174	169	185,100	211	188	203,800	238	200
Weight—Net 99 lbs.	*70*	94,600	99	136	99,000	102	139	104,500	109	143	112,500	118	149	131,200	140	162	151,900	167	176	178,500	203	195	197,100	230	208
	100	74,600	77	155	79,000	82	159	84,600	88	163	92,600	97	169	111,200	120	182	132,000	145	198	158,500	180	217	177,200	207	231

See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

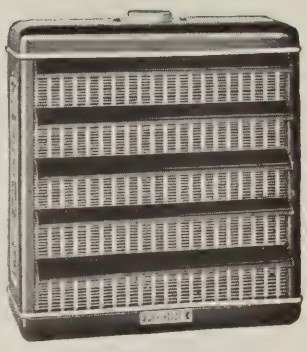
VARIABLE SPEED DATA

Model 440 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1140 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	105,600	87,150	61,400
Air Del. (c.f.m.)	1,320	973	628



MODEL 542



B.t.u. delivery at 2 lbs. steam, 60° entering air 130,000; equivalent in direct radiation 542; c.f.m. 1710; face velocity 763; motor hp. ⅛; r.p.m. 1125. Weight 114 lbs.

Applications: Model 542 is used chiefly for gymnasiums, auditoriums, churches and other rather large areas. Also widely used for industrial and garage heating. Available with single, two or three-speed motors.

Model 542 — Steam Press. Lbs. Sq. In. Gauge	0			2			5			10			25			50			100			150		
Steam Temp. ° Fahr.	212			218.5			227			239			267			298			338			366		
Capacity—130,000 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 5200 Btu per hour. Replaces 542 sq. ft. cast iron radiation. *Air Delivery*—*1710* cfm at standard air conditions..763 fpm. *Motor*—1/8 hp; 1125 rpm in 60 cycle and D.C. Operating watts 190. *Fan*—Brake hp .155; Dia. 17". *Tappings*—Supply 2"; Return 1" *Dimensions*—See Diagram. *Weight*—Net 114 lbs.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.
	0						186,000	194	87	196,000	206	92	219,000	234	103	244,500	268	115	277,500	316	130	300,000	351	141
	30				154,700	160	107	161,800	168	111	171,400	180	115	194,360	208	127	220,000	242	141	252,500	287	156	275,800	322	167
	50	133,000	137	119	138,200	143	122	145,200	151	125	155,000	163	130	178,000	191	142	203,500	224	156	236,200	268	173	259,200	303	185
	60	125,000	129	126	130,000	135	129	137,000	143	132	146,900	154	138	169,800	182	150	195,200	214	163	228,000	259	181	251,000	293	193
	70	116,500	120	133	121,900	126	136	128,900	134	139	138,800	146	145	161,800	173	157	187,000	205	171	220,000	250	189	243,000	284	201
	100	91,000	94	152	97,200	101	155	104,200	109	159	114,100	120	165	137,000	147	178	162,500	178	193	195,200	222	211	218,200	256	225

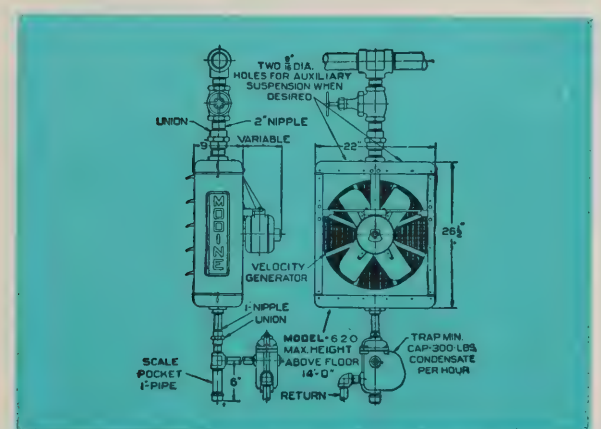
See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

VARIABLE SPEED DATA

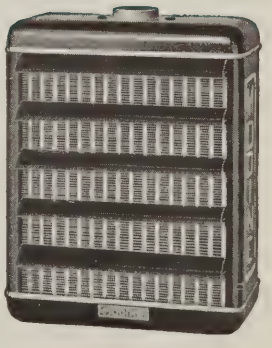
Model 542 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air-delivery at various speeds are as follows:

	High Speed 1125 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	130,000	105,400	79,500
Air Del. (c.f.m.)	1,710	1,270	880

STEAM CAPACITIES AND AUXILIARY DATA STEAM



MODEL 620



B.t.u. delivery at 2 lbs. steam, 60° entering air 148,800; equivalent in direct radiation 620; c.f.m. 2140; face velocity 810; motor hp. ⅙; r.p.m. 1120. Weight 121 lbs.

Applications: Model 620, a new addition to the Modine line, has been developed to satisfy those heating requirements that are a little large for the Model 542 to handle, yet do not need the additional heat delivery of the Model 710. Available with single, two or three speed motors.

Model 620 — Steam Press. Lbs. Sq. In. Gauge	0			2			5			10			25			50			100			150		
Steam Temp. ° Fahr.	212			218.5			227			239			267			298			338			366		
Capacity—148,800 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 6000 Btu per hour. Replaces 620 sq. ft. cast iron radiation. *Air Delivery*—2140 cfm at standard air conditions. 810 fpm. *Motor*—1/6 hp., 1120 rpm in 60 cycle or D.C. Operating watts 290. *Fan*—Brake hp. .218; Dia. 19". *Tappings*—Supply 2"; Return 1". *Dimensions*—See Diagram. *Weight*—Net 121 lbs.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.
	0						213,000	222	80	224,500	236	84	250,500	268	94	279,500	307	105	317,000	360	119	343,500	401	129
	30				177,000	183	101	184,900	193	104	196,200	206	108	222,500	238	119	251,500	276	130	289,000	329	145	315,500	368	156
	50	152,100	157	113	158,200	164	116	166,200	173	119	177,400	186	124	204,000	218	135	232,500	255	147	270,500	308	162	296,500	346	173
	60	142,700	147	120	148,800	154	123	156,700	163	126	168,810	177	132	194,300	208	142	223,500	246	155	261,000	297	171	287,000	335	182
	70	133,300	138	127	139,400	145	130	147,300	154	133	158,700	167	138	184,900	198	150	214,000	235	162	251,500	286	178	278,000	325	190
	100	105,100	108	148	111,200	115	151	119,200	124	154	130,500	137	160	156,700	168	171	185,900	204	185	223,500	266	202	249,500	291	214

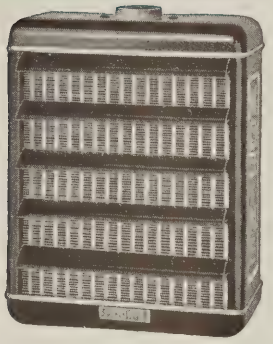
See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

VARIABLE SPEED DATA

Model 620 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

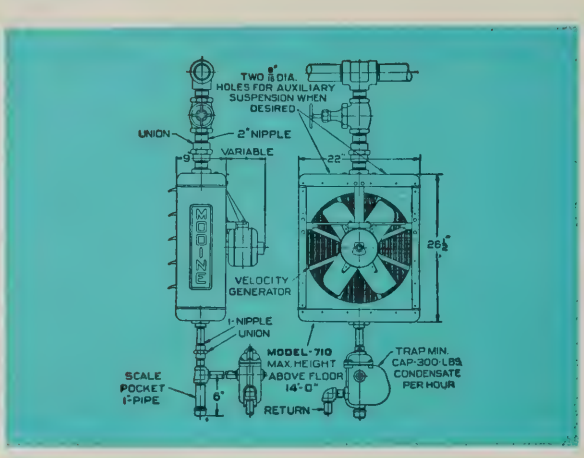
	High Speed 1120 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	148,800	123,400	99,800
Air Del. (c.f.m.)	2,140	1,684	1,243

MODEL 710



B.t.u. delivery at 2 lbs. steam, 60° entering air 170,300; equivalent in direct radiation 710; c.f.m. 2230; face velocity 855; motor hp. 1/6; r.p.m. 1120. Weight 123 lbs.

Applications: This unit replaces the famous Modine Model 701, the most popular unit heater ever offered. Its application is apparently unlimited, it having been most successfully used for all types of large space heating as well as drying operations. Available with single, two or three-speed motors.



Model 710	Steam Press. Lbs. Sq. In. Gauge	0			2			5			10			25			50			100			150		
	Steam Temp. ° Fahr.	212			218.5			227			239			267			298			338			366		
Capacity—170,300 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 6000 Btu per hour. Replaces 710 sq. ft. cast iron radiation. *Air Delivery*—*2230* cfm at standard air conditions. 855 fpm. *Motor*—1/6 hp; 1120 rpm in 60 cycle and D.C. Operating watts 290. *Fan*—Brake hp .218; Dia. 19". *Tappings*—Supply 2"; Return 1". *Dimensions*—See Diagram. *Weight*—Net 123 lbs.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.
	0							244,000	254	88	257,000	270	92	287,000	307	103	320,000	352	115	363,000	413	131	393,000	459	141
	30				202,500	210	108	211,800	222	111	224,500	236	116	254,500	272	127	288,000	316	140	331,000	376	157	361,000	422	168
	50	174,000	179	118	181,000	188	122	190,200	198	126	203,500	214	131	233,000	250	143	266,500	293	156	310,000	352	174	340,000	398	186
	60	163,200	168	126	170,300	176	129	179,300	187	133	192,300	202	138	222,500	239	150	255,800	282	165	298,500	340	181	329,000	384	194
	70	152,800	158	133	159,300	165	136	168,800	175	140	184,800	194	145	211,800	227	158	244,600	269	171	288,000	328	189	318,000	372	202
	100	120,300	124	153	127,300	132	156	136,300	142	160	149,300	157	165	179,500	192	179	212,800	235	193	255,800	290	212	286,000	334	225

See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

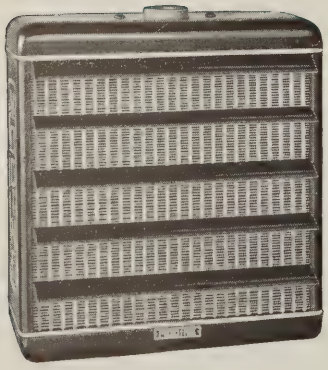
VARIABLE SPEED DATA

Model 710 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1120 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	170,300	141,300	106,200
Air Del. (c.f.m.)	2,230	1,775	1,230

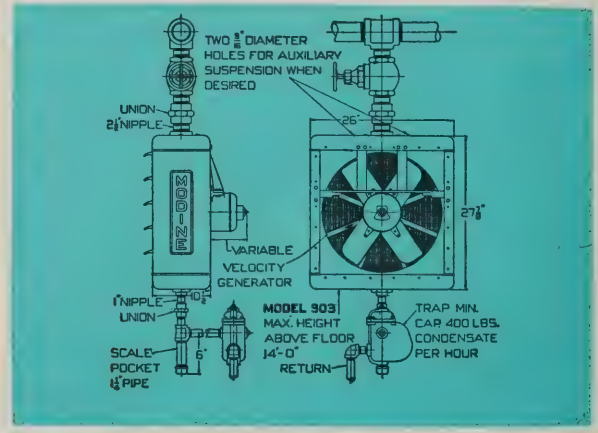
STEAM CAPACITIES AND AUXILIARY DATA STEAM

MODEL 903



B.t.u. delivery at 2 lbs. steam, 60° entering air 216,600; equivalent in direct radiation 903; c.f.m. 3,000; face velocity 955; motor hp. 1/4; r.p.m. 1125. Weight 172 lbs.

Applications: The Models 903 and 1163 because of their capacity, are practically restricted to industrial applications. The velocity generators give these units unusual "heat throw" ability. Available with single or three speed motors.



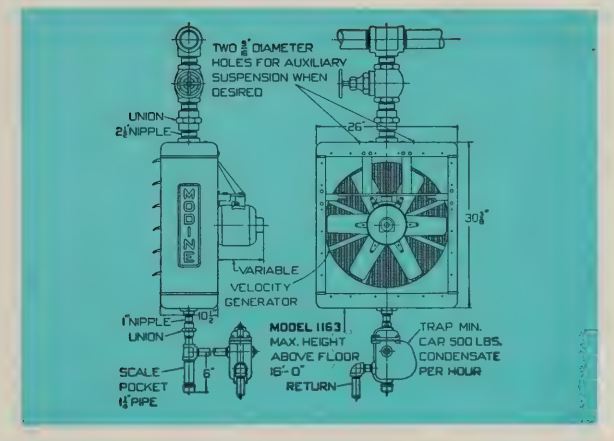
Model 903	Steam Press. Lbs. Sq. In. Gauge	0			2			5			10			25			50			100			150		
	Steam Temp. ° Fahr.	212			218.5			227			239			267			298			338			366		
Capacity—216,600 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 7200 Btu per hour. Replaces 903 sq. ft. cast iron radiation. *Air Delivery*—*3000* cfm at standard air conditions. 955 fpm. *Motor*—1/4 hp; 1125 rpm in 60 cycle and D.C. Operating watts 350. *Fan*—Brake hp .300; Dia. 21". *Tappings*—Supply 2 1/2"; Return 1" *Dimensions*—See Diagram. *Weight*—Net 172 lbs.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.
	0							310,000	323	83	326,500	343	87	365,000	391	97	408,000	448	109	462,000	525	123	501,000	585	134
	30				257,500	266	103	269,500	280	107	286,000	300	111	324,000	348	122	366,500	403	134	421,000	478	150	460,000	538	161
	50	221,500	228	116	230,500	239	118	242,000	252	122	258,500	272	127	296,500	318	139	339,500	372	151	394,000	448	167	432,000	505	178
	60	208,000	214	123	216,600	224	125	228,500	238	129	245,000	257	134	283,000	304	145	325,500	357	158	380,000	432	175	418,000	489	186
	70	194,100	200	130	203,000	210	132	215,000	224	135	231,000	242	141	269,500	288	153	312,000	342	166	366,500	417	183	405,000	473	194
	100	153,200	158	150	162,000	168	153	173,800	181	156	190,100	200	162	228,500	245	174	271,000	298	188	325,500	370	206	364,000	426	218

See page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

VARIABLE SPEED DATA

Model 903 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1125 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	216,600	177,700	134,400
Air Del. (c.f.m.)	3,000	2,250	1,570



MODEL 1163

B.t.u. delivery at 2 lbs. steam, 60° entering air 279,100; equivalent in direct radiation 1163; c.f.m. 4050; face velocity 1120; motor hp. ½; r.p.m. 1110. Weight 200 lbs.

Applications: (See Model 903). Even though a unit of great capacity, Model 1163 still retains the exclusive Modine feature of direct pipe suspension which not only makes for economy in installation but assures easy redirection of the air stream horizontally. Available with single or three-speed motors.



Model 1163 — *Steam Press.* Lbs. Sq. In. Gauge	0				2			5			10			25			50			100			150		
Steam Temp. ° Fahr.					218.5			227			239			267			298			338			366		
Capacity—279,100 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 8200 Btu per hour. Replaces 1163 sq. ft. cast iron radiation. *Air Delivery*—*4050* cfm at standard air conditions. 1120 fpm. *Motor*—1/2 hp; 1110 rpm in 60 cycle and D.C. Operating watts 670. *Fan*—Brake hp. .630; Dia. 22". *Tappings*-Supply 2½"; Return 1". *Dimensions*—See Diagram. *Weight*—Net 200 lbs.	Temp. *Entering Air* ° Fahr.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.
	0							399,500	416	79	421,000	442	83	470,000	504	93	524,500	575	104	595,000	676	118	644,000	750	127
	30				332,000	344	100	346,500	361	103	368,000	386	108	417,000	446	118	472,000	518	129	542,500	616	144	591,000	690	155
	50	285,500	294	113	296,500	307	115	311,500	324	118	332,500	350	123	382,000	410	134	436,000	478	144	507,000	576	161	556,000	650	172
	60	267,500	276	120	279,100	288	122	294,000	306	126	315,500	331	130	364,000	390	144	418,000	459	154	489,000	556	171	538,000	629	181
	70	250,000	258	127	261,500	271	130	276,500	288	133	297,500	312	138	346,500	372	149	402,000	441	161	472,000	537	177	521,000	609	189
	100	197,000	203	147	208,500	216	150	223,500	233	154	244,500	255	159	294,000	316	171	348,500	382	184	419,000	477	201	468,000	547	213

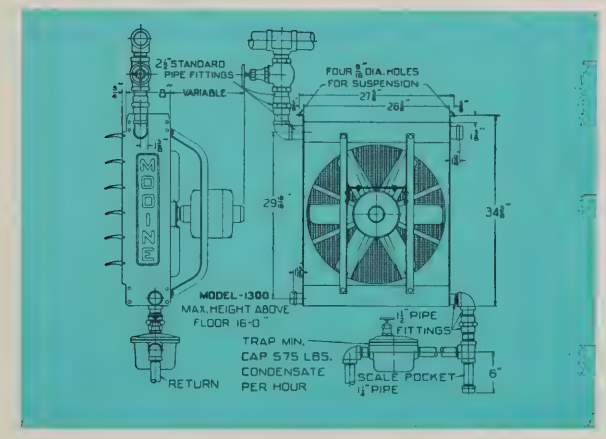
See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

VARIABLE SPEED DATA

Model 1163 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1110 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	279,100	226,500	171,800
Air Del. (c.f.m)	4,050	3,100	2,180

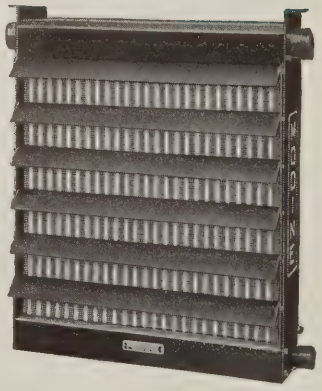
STEAM CAPACITIES AND AUXILIARY DATA STEAM



MODEL 1300

B.t.u. delivery at 2 lbs. steam, 60° entering air 312,000; equivalent in direct radiation 1300; c.f.m. 5010; face velocity 1190; motor hp. ¾; r.p.m. 1125. Weight 207 lbs.

Application: The Model 1300 is the largest of the single condenser, single fan Modine units. As in the case of Models 1545 and 2015, that follow, this unit is furnished with side tappings to save head room in installation. Available with single speed motors only.



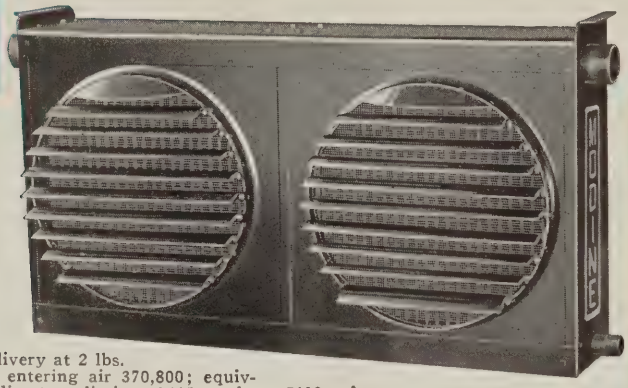
Model 1300 — *Steam Press.* Lbs. Sq. In. Gauge	0				3			5			10			25			50			100			150		
Steam Temp. ° Fahr.					218.5			227			239			267			298			338			366		
Capacity—312,000 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 9300 Btu per hour. Replaces 1300 sq. ft. cast iron radiation. *Air Delivery*—5010 cfm at standard air conditions. 1190 fpm. *Motor*—¾ hp; 1125 rpm in 60 cycle or D.C. Operating watts 850. *Fan*—Brake hp. .87; Dia. 24". *Tappings*—Supply 2½"; Return 1½". *Dimensions*—See Diagram. *Weight*—Net 207 lbs.	Temp. *Entering Air* ° Fahr.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* °F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr	*Out. Air* °F	*Heat Del.* B.T.U. per Hr.	*C'd-sate* #per Hr.	*Out. Air* ° F.
	0							447,000	465	72	470,000	494	76	526,000	563	85	586,000	644	95	665,000	756	107	720,000	841	116
	30				371,000	384	94	387,500	404	97	411,000	432	101	467,000	500	110	527,000	579	121	606,000	689	134	661,000	772	144
	50	318,500	328	107	332,000	344	110	348,000	362	112	372,000	391	117	427,000	457	127	488,000	536	138	566,000	643	152	622,000	727	162
	60	299,000	308	115	312,000	323	117	328,500	342	120	352,500	370	125	407,500	436	135	468,500	514	146	547,000	622	160	602,000	703	170
	70	279,500	288	122	292,500	303	125	309,000	322	128	332,500	349	132	387,500	415	142	449,000	493	154	527,000	599	168	582,500	680	179
	100	220,500	227	143	233,000	242	146	250,000	260	149	273,500	298	156	328,500	352	165	389,500	428	177	468,500	532	192	523,000	623	203

See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

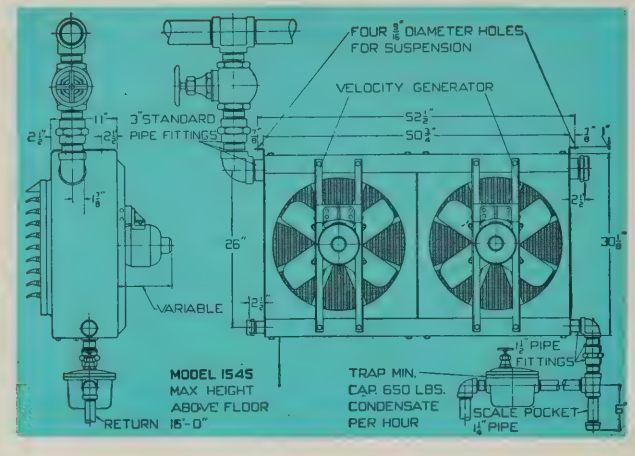
VARIABLE SPEED DATA

Model 1300 is also available with polyphase three-speed controllers. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1125 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Capacity (B.t.u.)	312,000	268,300	209,000
Air Delivery (C.f.m.)	5,010	3,775	2,695



MODEL 1545



B.t.u. delivery at 2 lbs. steam, 60° entering air 370,800; equivalent in direct radiation 1545; c.f.m. 5400; face velocity 1155; motor hp. ¼ (2); r.p.m. 1125. Weight 383 lbs.

Applications: Models 1545 and 2015 are the largest of the Modine line. Because of their great capacity and long distance heat delivery, these models are especially suited to buildings not only of large area but of extreme height. As these units have been especially designed with side openings to save head room in installation, auxiliary piping supports should be employed.

Model 1545 — Steam Press. Lbs. Sq. In. Gauge	0				2			5			10			25			50			100			150		
Steam Temp. ° Fahr.	212				218.5			227			239			267			298			338			366		
Capacity—370,800 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 14,000 Btu per hour. Replaces 1545 sq. ft. cast iron radiation. *Air Delivery*—*5400* cfm at standard air conditions. 1155 fpm. *Motors*—Two 1/4 hp, 1125 rpm in 60 cycle and D.C. Operating watts 700. *Fans*—Two; Brake hp .600. Dia. 21". *Tappings*—Supply 3"; Return 1½". *Dimensions*—See Diagram. *Weight*—Net 383 lbs.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.
	0							531,000	553	79	560,000	589	83	625,000	670	93	698,000	766	104	791,000	899	118	858,000	1002	127
	30				441,000	457	100	461,000	480	103	489,000	514	107	555,000	595	118	628,000	690	129	721,000	819	144	786,000	969	154
	50	379,500	391	112	394,000	408	115	414,000	431	118	442,000	464	123	508,000	545	134	581,000	638	146	675,000	767	161	740,000	865	172
	60	355,500	366	119	370,800	384	123	391,000	407	126	419,000	440	130	485,000	520	140	557,000	611	157	651,000	740	169	717,000	838	180
	70	332,500	342	127	348,000	360	129	367,500	382	133	396,000	416	138	461,000	495	149	534,000	586	161	628,000	714	177	694,000	811	189
	100	262,000	270	147	277,500	287	150	297,500	310	154	325,500	342	159	391,000	419	171	464,000	509	184	558,000	635	201	624,000	730	213

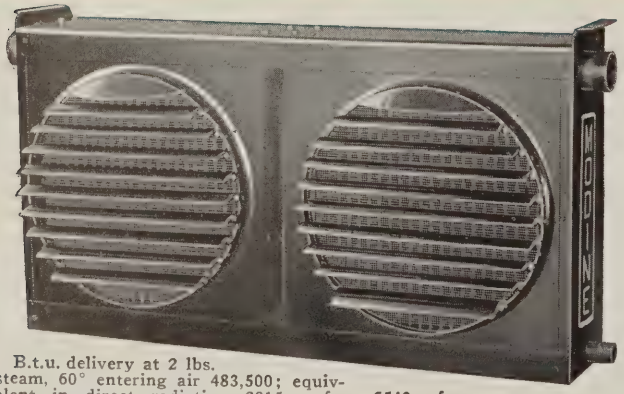
See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

VARIABLE SPEED DATA

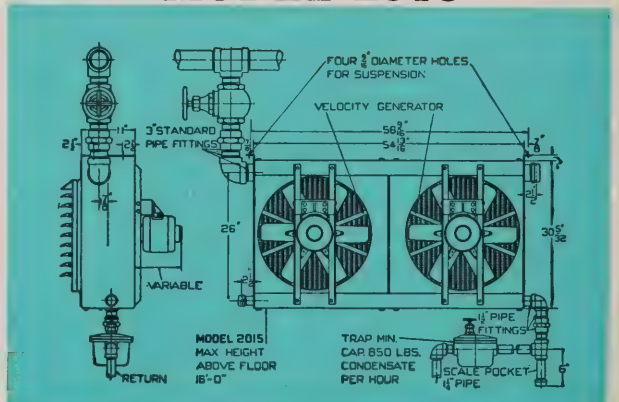
Model 1545 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1125 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	370,800	317,000	240,000
Air Del. (c.f.m.)	5,400	4,280	2,970

STEAM CAPACITIES AND AUXILIARY DATA STEAM



MODEL 2015



B.t.u. delivery at 2 lbs. steam, 60° entering air 483,500; equivalent in direct radiation 2015; c.f.m. 6540; face velocity 1395; motor hp. ½ (2); r.p.m. 1110. Weight 448 lbs.

Applications: (See Model 1545).

Model 2015 — Steam Press. Lbs. Sq. In. Gauge	0				2			5			10			25			50			100			150		
Steam Temp. ° Fahr.	212				218.5			227			239			267			298			338			366		
Capacity—483,500 Btu per hour at 60° entering air and 2 lbs. steam pressure; still air 16,000 Btu per hour. Replaces 2015 sq. ft. cast iron radiation. *Air Delivery*—*6540* cfm at standard air conditions. 1395 fpm. *Motors*—Two 1/2 hp, 1110 rpm in 60 cycle or D.C. Operating watts 1340. *Fans*—Two; Brake hp 1.260. Dia. 22". *Tappings*—Supply 3"; Return 1½". *Dimensions*—See Diagram. *Weight*—Net 448 lbs.	Temp. Entering Air ° Fahr.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.	Heat Del. B.T.U. per Hr.	C'd-sate #per Hr.	Out. Air ° F.
	0							691,500	720	85	728,000	765	89	814,000	872	100	908,500	997	110	1,029,000	1138	126	1,115,000	1300	137
	30				573,500	593	105	600,000	625	108	636,500	669	113	722,000	774	124	816,500	897	137	939,000	1066	153	1,023,000	1196	164
	50	493,500	509	117	513,000	531	120	539,000	561	123	576,000	605	128	662,000	710	140	756,000	830	153	878,000	998	169	964,000	1126	181
	60	463,000	477	124	483,500	500	127	508,500	529	130	545,000	573	136	631,000	676	147	726,000	796	161	848,000	963	178	934,000	1090	189
	70	432,500	446	131	452,500	468	134	478,000	498	138	515,000	541	143	601,000	644	155	695,000	764	168	817,000	929	185	902,500	1054	198
	100	341,000	351	151	359,500	372	154	387,000	403	158	423,000	444	163	509,000	546	176	604,000	664	190	726,000	825	208	811,000	947	221

See Page 13 for determining capacities and final air temperatures at other steam pressures and other entering air temperatures.

VARIABLE SPEED DATA

Model 2015 is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (2 lbs. steam, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1110 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	483,500	400,000	306,000
Air Del. (c.f.m.)	6,540	4,870	3,430

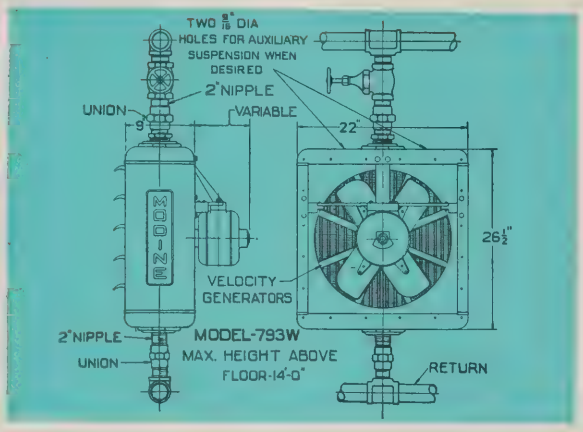
MODINE

HOT WATER TYPE UNIT HEATERS

While Modine Hot Water Unit Heaters are of the same overall dimensions, employ the same power units and have the same exterior finish as their companion steam-type unit heaters (See Model 710 Steam, Model 793-W Hot Water) they differ considerably in condenser construction.

The copper tubes used in the hot water unit are of the oval, flattened type, many more tubes being employed than in the steam unit. This construction provides a greater amount of prime surface and thus compensates for the lower temperature differential ordinarily existing on a hot water system. Due to the fact that the pressures encountered in hot water heating are comparatively low, the tubes are not provided with the expansion bend feature. For the same reason upper and lower copper headers are rectangular rather than being cylindrical. All hot water units, larger in size than the Model 212-W are provided with velocity generators; all of them without exception feature a permanent metallic bond between fins and tubes of the condenser.

All Modine Hot Water Unit Heaters except Model 73-W are guaranteed for a maximum of 150 lbs. hydrostatic pressure. The Model 73-W is guaranteed for 50 lbs.



Hot Water Capacities and Auxiliary Data Hot Water

Model 73-W

Capacity—11,000 Btu per hour at 60° entering air and 170° average water; still air 556 Btu per hour. Replaces 73 sq. ft. cast iron radiation on hot water system.
Air Delivery—194 cfm at 170° inlet water and standard air conditions. 519 fpm.
Motor—6 watts (output); 1550 rpm in 60 cycle or D.C.; Operating watts 30.
Fan—Brake hp. .008; Dia. 8".
Tappings—Supply 1"; Return 1".
Dimensions—See Page 15, Model 76.
Weight—Net 25 lbs.

Entering Air Temp. of °F.	Heat Delivery, B.T.U. per hour, and entering water temperature based on hot water flow of 15 lbs. per min. at the following average water temp.															
	130° F.		140° F.		150° F.		160° F.		170° F.		180° F.		190° F.		200° F.	
	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.
30	136	10,000	146	11,000	157	12,000	167	13,000	178	14,000	188	15,000	199	16,000	209	17,000
40	135	9,000	146	10,000	156	11,000	167	12,000	177	13,000	188	14,000	198	15,000	209	16,000
50	134	8,000	145	9,000	156	10,000	166	11,000	177	12,000	187	13,000	198	14,000	208	15,000
60	134	7,000	144	8,000	155	9,000	166	10,000	176	11,000	187	12,000	197	13,000	208	14,000
70	133	6,000	144	7,000	154	8,000	165	9,000	176	10,000	186	11,000	197	12,000	207	13,000
100	132	3,000	142	4,000	153	5,000	163	6,000	174	7,000	184	8,000	195	9,000	206	10,000

See Page 13 for determining capacities and final air temperatures at other average water and other entering air temperatures.

VARIABLE SPEED DATA

Model 73-W is also available with two-speed A.C. motor. B.t.u. capacity (170° average water, 60° entering air) and air delivery at respective speeds are as follows:

	High Speed 1550 R.p.m.	Low Speed 1200 R.p.m.
Cap. (B.t.u.)	11,000	10,080
Air Del. (c.f.m.)	194	168

Model 212-W

Capacity—31,800 Btu per hour at 60° entering air and 170° average water; still air 1670 Btu per hour. Replaces 212 sq. ft. cast iron radiation on hot water system.
Air delivery—515 cfm at 170° inlet water and standard air conditions. 480 fpm.
Motor—1/40 hp., 1590 rpm in 60 cycle and D.C. Operating watts 65.
Fan—Brake hp. .026; Dia. 12".
Tappings—Supply 1¼"; Return 1¼
Dimensions—See Page 16, Model 152.
Weight—Net 67 lbs.

Entering Air Temp. of °F.	Heat Delivery, B.T.U. per hour, and entering water temperature based on hot water flow of 35 lbs. per min. at the following average water temp.															
	130° F.		140° F.		150° F.		160° F.		170° F.		180° F.		190° F.		200° F.	
	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.
30	140	28,900	151	31,800	162	34,700	173	37,600	184	40,500	195	43,400	206	46,300	217	49,200
40	139	26,000	150	28,900	161	31,800	172	34,700	183	37,600	194	40,500	205	43,400	216	46,300
50	138	23,200	149	26,000	160	28,900	171	31,800	182	34,700	193	37,600	204	40,500	215	43,400
60	137	20,200	148	23,200	159	26,000	170	28,900	181	31,800	192	34,700	203	37,600	214	40,000
70	136	17,400	147	20,200	158	23,200	169	26,000	180	28,900	191	31,800	202	34,700	213	37,600
100	133	8,690	144	11,600	155	14,500	166	17,400	177	20,200	188	23,200	199	26,000	210	28,900

See page 13 for determining capacities and final air temperatures at other average water temperatures and other entering air temperatures.

VARIABLE SPEED DATA

Model 212-W is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (170° F. average water, 60° entering air) and air delivery at respective speeds are as follows:

	High Speed 1590 R.p.m.	Medium Speed 1350 R.p.m.	Low Speed 1000 R.p.m.
Cap. (B.t.u.)	31,800	28,300	22,700
Air Del. (c.f.m.)	515	453	339

Model 279-W

Capacity—41,900 Btu per hour at 60° entering air and 170° average water; still air 1670 Btu per hour. Replaces 279 sq. ft. cast iron radiation on hot water system.
Air Delivery—700 cfm at 170° inlet water and standard air conditions. 645 fpm.
Motor—1/20 hp., 1140 rpm in 60 cycle and D.C. Operating watts 76.
Fan—Brake hp. .050; Dia. 12".
Tappings—Supply 1¼"; Return 1¼".
Dimensions—See Page 18, Model 238.
Weight—Net 91 lbs.

Heat Delivery, B.T.U. per hour, and entering water temperature based on hot water flow of 25 lbs. per min. at the following average water temp.

Entering Air Temp. of ° F.	130° F.		140° F.		150° F.		160° F.		170° F.		180° F.		190° F.		200° F.	
	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.
30	143	38,150	154	41,900	165	45,900	177	49,700	188	53,500	199	57,200	210	61,100	222	65,000
40	142	34,250	153	38,150	164	41,900	175	45,900	187	49,700	198	53,500	209	57,200	220	61,100
50	140	30,500	152	34,250	163	38,150	174	41,900	185	45,900	197	49,700	208	53,500	219	57,200
60	139	26,750	150	30,500	162	34,250	173	38,150	184	41,900	195	45,900	207	49,700	218	53,500
70	138	23,000	149	26,750	160	30,500	172	34,250	183	38,150	194	41,900	205	45,900	217	49,700
100	134	11,500	145	15,750	156	19,000	168	23,000	179	26,750	190	30,500	202	34,250	213	38,150

See Page 13 for determining capacities and final air temperatures at other average water and other entering air temperatures.

VARIABLE SPEED DATA

Model 279-W is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (170° average water, 60° entering air) and air delivery at respective speeds are as follows:

	High Speed 1140 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Capacity (B.t.u.)	41,900	34,600	25,400
Air Del. (c.f.m.)	700	506	342

Model 399-W

Capacity—59,900 Btu per hour at 60° entering air and 170° average water; still air 2360 Btu per hour. Replaces 399 sq. ft. cast iron radiation on hot water system.
Air Delivery—992 cfm at 170° inlet water and standard air conditions. 660 fpm.
Motor—1/10 hp., 1140 rpm in 60 cycle and D.C. Operating watts 150.
Fan—Brake hp. .067; Dia. 13".
Tappings—Supply 1½"; Return 1½".
Dimensions—See Page 18, Model 275.
Weight—Net 102 lbs.

Heat Delivery, B.T.U. per hour, and entering water temperature based on hot water flow of 32 lbs. per min. at the following average water temp.

Entering Air Temp. of ° F.	130° F.		140° F.		150° F.		160° F.		170° F.		180° F.		190° F.		200° F.	
	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.
30	144	54,500	156	59,900	167	65,400	179	70,800	190	76,200	201	81,700	213	87,100	224	92,500
40	143	49,000	154	54,500	166	59,900	177	65,400	189	70,800	200	76,200	211	81,700	223	87,100
50	141	43,700	153	49,000	164	54,500	176	59,900	187	65,400	199	70,800	210	76,200	221	81,700
60	140	38,000	151	43,700	163	49,000	174	54,500	186	59,900	197	65,400	209	70,800	220	76,200
70	139	32,600	150	38,000	161	43,700	173	49,000	184	54,500	196	59,900	207	65,400	219	70,800
100	134	16,300	146	21,800	157	27,200	169	32,600	180	38,000	191	43,700	203	49,000	214	54,800

See Page 13 for determining capacities and final air temperatures at other average water and other entering air temperatures.

VARIABLE SPEED DATA

Model 399-W is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (170° F. average water, 60° entering air) and air delivery at respective speeds are as follows:

	High Speed 1140 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	59,900	47,300	36,000
Air Del. (c.f.m.)	992	745	520

Hot Water Capacities and Auxiliary Data Hot Water

Model 497-W

Capacity—74,600 Btu per hour at 60° entering air and 170° average water; still air 2850 Btu per hour. Replaces 497 sq. ft. cast iron radiation on hot water system.
Air Delivery—1250 cfm at 170° inlet water and standard air conditions. 667 fpm.
Motor—1/10 hp., 1140 rpm. in 60 cycle and D.C. Operating watts 185.
Fan—Brake hp. .120; Dia. 15".
Tappings—Supply 1½"; Return 1½".
Dimensions—See Page 19, Model 440.
Weight—Net 116 lbs.

Heat Delivery, B.T.U. per hour, and entering water temperature based on hot water flow of 32 lbs. per min. at the following average water temp.

Entering Air Temp. of ° F.	130° F.		140° F.		150° F.		160° F.		170° F.		180° F.		190° F.		200° F.	
	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.
30	148	67,900	159	74,600	171	81,600	183	88,100	195	95,000	207	103,700	218	108,800	230	115,300
40	146	61,300	158	67,900	169	74,600	181	81,600	193	88,100	205	95,000	217	103,700	228	108,800
50	144	54,400	156	61,300	168	67,900	179	74,600	191	81,600	203	88,100	215	95,000	227	103,700
60	142	47,600	154	54,400	166	61,300	178	67,900	189	74,600	201	81,600	213	88,100	225	95,000
70	141	40,900	152	47,600	164	54,400	176	61,300	188	67,900	199	74,600	211	81,600	223	88,000
100	135	20,400	147	27,200	159	34,000	171	40,900	182	47,600	194	54,400	206	61,300	218	67,900

See Page 13 for determining capacities and final air temperatures at other average water and other entering air temperatures.

VARIABLE SPEED DATA

Model 497-W is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (170° F. average water, 60° entering air) and air delivery at respective speeds are as follows:

	High Speed 1140 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	74,600	59,600	42,600
Air Del. (c.f.m.)	1,250	922	597

Model 605-W

Capacity—90,800 Btu per hour at 60° entering air and 170° average water still air 3620 Btu per hour. Replaces 605 sq. ft. cast iron radiation on hot water system.
Air Delivery—1605 cfm at 170° inlet water and standard air conditions. 682 fpm.
Motor—1/8 hp., 1125 rpm. in 60 cycle and D.C. Operating watts, 190.
Fan—Brake hp. .155; Dia. 17".
Tappings—Supply 2"; Return 2".
Dimensions—See Page 20, Model 542.
Weight—Net 135 lbs.

Heat Delivery, B.T.U. per hour, and entering water temperature based on hot water flow of 40 lbs. per min. at the following average water temp.

Entering Air Temp. of ° F.	130° F.		140° F.		150° F.		160° F.		170° F.		180° F.		190° F.		200° F.	
	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.
30	147	82,700	159	90,800	171	99,200	182	107,400	194	115,700	206	123,700	218	132,300	229	140,400
40	145	74,300	157	82,700	169	90,800	181	99,200	192	107,400	204	115,700	216	123,700	228	132,300
50	144	66,200	155	74,300	167	82,700	179	90,800	191	99,200	202	107,400	214	115,700	226	123,700
60	142	58,000	154	66,200	165	74,300	177	82,700	189	90,800	201	99,200	212	107,400	224	115,700
70	140	49,600	152	58,000	164	66,200	175	74,300	187	82,700	199	90,800	211	99,200	222	107,400
100	135	24,800	147	33,100	159	41,300	170	49,600	182	58,000	194	66,200	205	74,300	217	82,700

See page 13 for determining capacities and final air temperatures at other average water temperatures and other entering air temperatures.

VARIABLE SPEED DATA

Model 605-W is also available with three-speed A.C. or D.C. motors. B.t.u. capacity (170° average water, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1125 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	90,800	73,600	55,600
Air Del. (c.f.m.)	1,605	1,181	825

Model 793-W

Capacity—119,000 Btu per hour at 60° entering air and 170° average water; still air 4170 Btu per hour. Replaces 793 sq. ft. cast iron radiation on hot water system.
Air Delivery—2105 cfm at 170° inlet water and standard air conditions. 770 fpm.
Motor—1/6 hp., 1120 rpm. in 60 cycle and D.C. Operating watts, 290.
Fan—Brake hp. .218; Dia. 19".
Tappings—Supply 2"; Return 2".
Dimensions—See Page 20, Model 710.
Weight—Net 145 lbs.

Heat Delivery, B.T.U. per hour, and entering water temperature based on hot water flow of 40 lbs. per min. at the following average water temp.

Entering Air Temp. of ° F.	130° F.		140° F.		150° F.		160° F.		170° F.		180° F.		190° F.		200° F.	
	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.
30	152	107,500	165	119,500	177	129,500	189	140,500	202	151,500	214	162,500	226	173,000	238	183,500
40	150	97,500	162	107,500	175	119,000	187	129,500	199	140,500	212	151,500	224	162,500	236	173,000
50	148	86,500	160	97,500	172	107,500	185	119,000	197	129,500	209	140,500	222	151,500	234	162,500
60	146	75,500	158	86,500	170	97,500	182	107,500	195	119,000	207	129,500	219	140,500	232	151,500
70	144	65,000	156	75,500	168	86,500	180	97,500	192	107,500	205	119,000	217	129,500	229	140,500
100	137	32,500	149	43,500	161	54,500	174	65,000	186	75,500	198	86,500	210	97,500	222	107,500

See page 13 for determining capacities and final air temperatures at other average water temperatures and other entering air temperatures.

VARIABLE SPEED DATA

Model 793-W is also available with two-speed A.C. and three-speed A.C. or D.C. motors. B.t.u. capacity (170° average water, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1120 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	119,000	98,800	74,100
Air Del. (c.f.m.)	2,105	1,675	1,160

Model 1010-W

Capacity—151,500 Btu per hour at 60° entering air and 170° average water; still air 5010 Btu per hour. Replaces 1010 sq. ft. cast iron radiation on hot water system.
Air Delivery—2835 cfm at 170° water and standard air conditions. 860 fpm.
Motor—1/4 hp.; 1125 rpm in 60 cycle and D.C. Operating watts, 350.
Fan—Brake hp. .300; Dia. 21".
Tappings—Supply, 2½"; Return 2½"
Dimensions—See Page 21, Model 903.
Weight—Net 201 lbs.

Heat Delivery, B.T.U. per hour, and entering water temperature based on hot water flow of 48 lbs. per min. at the following average water temp.

Entering Air Temp. of ° F.	130° F.		140° F.		150° F.		160° F.		170° F.		180° F.		190° F.		200° F.	
	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp. °F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.
30	154	138,500	166	151,500	179	165,500	191	179,500	204	193,500	216	207,500	228	220,500	241	234,500
40	152	124,500	164	138,500	176	151,500	189	165,500	201	179,500	214	193,500	226	207,500	238	220,500
50	149	110,500	162	124,500	174	138,500	186	151,500	199	165,500	211	179,500	224	193,500	236	207,500
60	147	96,500	159	110,500	172	124,500	184	138,500	196	151,500	209	165,500	221	179,500	234	193,500
70	144	83,500	157	96,500	169	110,500	182	124,500	194	138,500	206	151,500	219	165,500	231	179,500
100	137	41,500	150	55,500	162	69,500	174	83,500	187	96,500	199	110,500	212	124,500	224	138,500

See page 13 for determining capacities and final air temperatures at other average water temperatures and other entering air temperatures.

VARIABLE SPEED DATA

Model 1010-W is also available with three-speed A.C. or D.C. motors. B.t.u. capacity (170° average water, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1125 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	151,500	124,100	93,950
Air Del. (c.f.m.)	2,835	2,125	1,484

Hot Water Capacities and Auxiliary Data Hot Water

Model 1303-W

Capacity—195,500 Btu per hour at 60° entering air and 170° average water; still air 5700 Btu per hour. Replaces 1303 sq. ft. cast iron radiation on hot water system.
Air Delivery—3830 cfm at 170° inlet water and standard air conditions. 1015 fpm.
Motor—1/2 hp.; 1110 rpm in 60 cycle and D.C.
Fan—Brake hp. .630; Dia. 22".
Tappings—Supply 2½"; Return 2½"
Dimensions—See Page 21, Model 1163.
Weight—Net 234 lbs.

Heat Delivery, B.T.U. per hour, and entering water temperature based on hot water flow of 48 lbs. per min. at the following average water temp.

Entering Air Temp. of ° F.	130° F.		140° F.		150° F.		160° F.		170° F.		180° F.		190° F.		200° F.	
	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.	Enter. Water Temp.° F.	B.T.U.
30	161	177,500	174	195,500	187	213,500	200	231,500	213	249,500	226	266,500	239	284,500	253	302,500
40	158	160,500	171	177,500	184	195,500	197	213,500	210	231,500	223	249,500	236	266,500	249	284,500
50	155	142,500	168	160,500	181	177,500	194	195,500	207	213,500	220	231,500	233	249,500	246	266,500
60	152	124,500	165	142,500	178	160,500	191	177,500	204	195,500	217	213,500	230	231,500	243	249,500
70	148	106,500	162	124,500	175	142,500	188	160,500	201	177,500	214	195,500	227	213,500	240	231,500
100	139	53,500	152	71,500	166	89,500	178	106,500	192	124,500	205	142,500	218	160,500	231	177,500

See page 13 for determining capacities and final air temperatures at other average water temperatures and other entering air temperatures.

VARIABLE SPEED DATA

Model 1303-W is also available with three-speed A.C. or D.C. motors. B.t.u. capacity (170° average water, 60° entering air) and air delivery at various speeds are as follows:

	High Speed 1110 R.p.m.	Medium Speed 850 R.p.m.	Low Speed 600 R.p.m.
Cap. (B.t.u.)	195,500	158,800	120,300
Air Del. (c.f.m.)	3,830	2,930	2,060

MOTOR WIRING AND THERMOSTATIC CONTROL DIAGRAMS

The motor wiring diagrams shown below cover both manual and automatic control of Modine Unit Heaters for usual wiring circuits. Where some unusual wiring or temperature control arrangement is necessary (or where special motors are to be installed), it is advisable to consult a Modine representative.

Although Modine Unit Heaters can be very simply controlled manually, automatic control is now widely used. The common method of automatic control is the room thermostat (Diagrams I, III and IX). This instrument opens and closes the unit heater motor circuit to maintain a room temperature within two degrees of its setting.

Where there is a possibility that the supply of steam to a unit heater will not be constant, control apparatus should be employed that will prevent the heater from operating when it lacks steam, hence prohibit it from blowing cold air. Standard instruments are available which, connected in series with a room thermostat, will be actuated either by the pressure or the temperature of the steam and will open the electrical circuit when there is no steam in the unit.

Thermostats and pressure or surface type limit control instruments should be installed directly in the motor circuit only when the electrical service is direct current or single phase alternating current and the current input or voltage does not exceed the capacity of the instrument.

Under other conditions an automatic starting switch or relay must be installed (Diagram III). The relay serves the purpose of carrying the load, the thermostat acting only as a pilot controlling the relay.

Motor information is attached to each unit heater motor or control and should be checked before installing motor equipment.

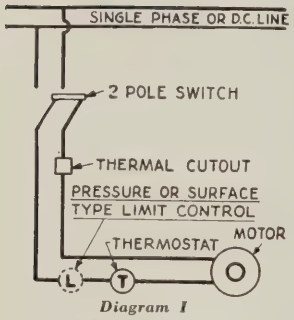


Diagram I
Constant Speed
Single Phase or D. C. Motors
All Models
Thermostatic and Pressure or Surface Type Limit Control Shown

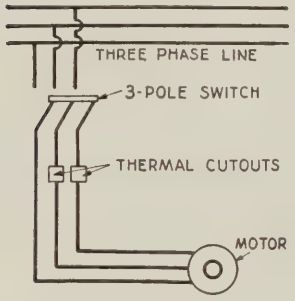


Diagram II
Constant Speed, Three Phase Motors
Model 181 and larger units

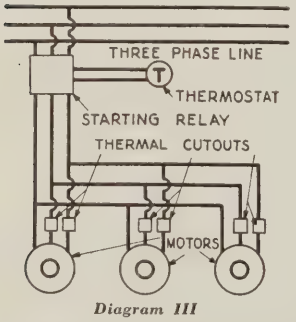


Diagram III
Constant Speed, Three Phase Motors
Model 181 and larger units
Thermostatic Control for one or more units shown

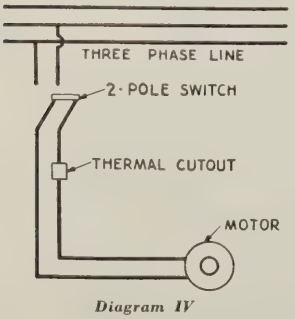


Diagram IV
Constant Speed, Single Phase Motors on three phase line (This single phase connection to three phase line may be used on any other single phase diagram shown)

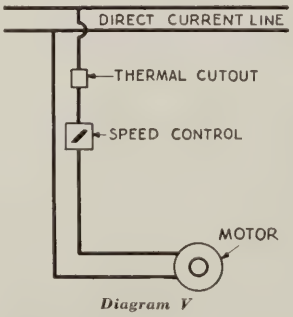


Diagram V
Variable Speed, Direct Current Motors
All Models

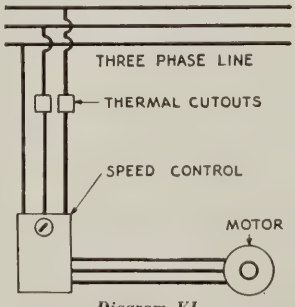


Diagram VI
Variable Speed, Three Phase Motors
Model 181 and larger units

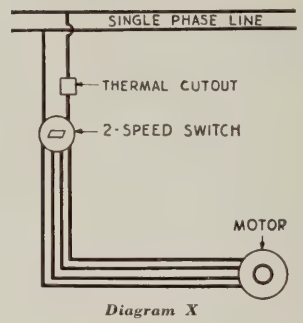


Diagram X
Two Speed, Single Phase Split Phase Motors with four leads

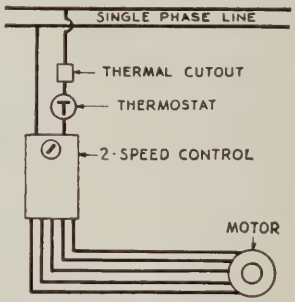


Diagram IX
Two Speed, Single Phase Capacitor Motors with five leads
Thermostatic Control shown

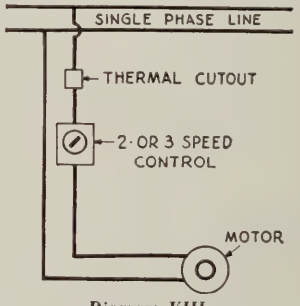


Diagram VIII
Two Speed, Single Phase or Three Speed, Single Phase Shaded Pole Motors with two leads

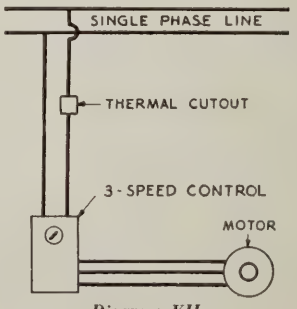


Diagram VII
Three Speed, Single Phase Capacitor Motors with three leads

TYPICAL SPECIFICATION MODINE UNIT HEATERS

Furnish and install unit heaters having minimum B.t.u. capacities, minimum air delivery (c.f.m.) capacities and minimum face velocities (f.p.m.), also maximum air outlet temperatures, as specified below, based on steam pressures, entering air temperatures and maximum motor r.p.m. as given.

Unit Heaters shall be of the propeller-fan type, so designed as to permit their direct suspension from the steam main by means of steam supply branch, without the use of brackets, rods or other supplementary supports from wall or ceiling. Unit Heaters of more than 300,000 B.t.u. capacity may be of design employing supplementary supports.

All steam and condensate carrying passages of unit heaters including condenser tanks, shall be of copper or copper alloy construction throughout and shall be cylindrical in shape. Each tube of the condenser shall be provided with means for individual expansion and contraction to permit differential expansion with respect to adjacent tubes without strain on header plates. The entire chain of steam and condensate carrying passages shall be welded and brazed into a single structure without gasket, bolt or screw joints.

Condenser tubes shall be of heavy gauge brass or copper having minimum diameter of $\frac{3}{8}$ in. Copper fins of minimum .008 in. thickness shall be permanently and integrally joined to the tubes by means of a metallic bond that will not melt or soften under temperatures up to 500° F. After assembly each unit heater shall be given both steam and hydrostatic tests of not less than 150 lbs. gauge.

Exception to above provisions may be made on unit heaters having capacities less than 20,000 B.t.u. but in no case shall such small units be of other than non-ferrous construction throughout steam and condensate carrying passages, nor be tested to less than 50 lbs. gauge steam and hydrostatic pressures.

Unit Heater casings or frames shall in no instance be less than 16 gauge sheet steel excepting supplementary parts such as deflectors and fan shrouds; frames of units of 200,000 B.t.u. capacity and over shall be not less than 14 gauge sheet steel; frames of units of 300,000 B.t.u. or over not less than 12 gauge sheet steel. Unit Heaters shall be so assembled that no bolts or screws are visible on front or sides of frame.

Electric motors shall be of current characteristics as specified below and shall be the product of a reputable manufacturer.

Maximum Unit Heater speeds shall be 1140 r.p.m. except on units of less than 40,000 B.t.u. capacity, on which maximum r.p.m. may be 1600. (To the Architect: Our experiments made in response to insistent demand for quietness in unit heaters has developed the fact, to the best of our ability to determine same, that the amount of air to properly distribute more than 40,000 B.t.u. from a unit heater, is such as to create objectionable noise if the fan delivering the air from a unit of such capacity, is turning more than about 1140 r.p.m., that is, the actual speed of a theoretical and synchronous 60-cycle speed of 1200 r.p.m.—Modine Manufacturing Co.)

All ratings, both heat and air, shall be based on standard code of A.S.H. & V.E. and I.U.H.A. and no unit heater shall be given consideration where published literature of its manufacturer does not clearly indicate such basis of rating.

THE MODINE GUARANTEE

We warrant all Modine heating equipment to be free from defects in material and workmanship under normal use and service; our obligation under this warranty being limited to making good at our factory, any part or parts thereof which shall within one year from date of shipment from our factory be returned to our factory with transportation charges prepaid, and which our examination shall disclose to have been defective.

This warranty does not cover any labor charges for replacement of parts, adjustments, repairs, or any other work done. We assume no responsibility for consequential damages of any kind, and the purchaser or user, by acceptance of this equipment, assumes the responsibility for the consequences of its use or misuse.

This warranty does not apply to any equipment which has been or may be repaired or altered in any way outside of our factory, so as, in our judgment, to affect its stability, nor to any equipment which has been subject to misuse, negligence, or operating conditions in excess of those stated in our catalog.

All steam ratings, both heat and air, are based on standard code of A.S.H. & V.E. and I.U.H.A.

OTHER MODINE PRODUCTS

A leader in the design of propeller-fan unit heaters, the Modine Manufacturing Company has also pioneered in copper convectors—of the concealed-behind-plaster type as well as the cabinet type.

Modine Convectors and Modine Copper Cast radiators (combination radiant and convector heater) are both built with unusual care as to quality of materials, and with painstaking attention to every detail of design making for convenience of installation. A complete description of these Modine products is given in Catalog 136 and Bulletin 1236.

The Modine-Syncromatic Air Conditioner, a new addition to the Modine line, provides complete winter or summer air conditioning, or both, for domestic and light commercial application. (Catalog 637)

Modine manufactures blast heaters for all manner of heat transfer applications—air conditioners, can dryers, laundry dryers and industrial process drying. Requirements may be met from Modine stock sizes or the Modine Engineering Department will design a heat transfer section to fit the individual application.

Modine Blast Heaters are also available in a range of capacities suited for application to central system heating and ventilating. (Catalog 337)

There is also available a wide line of Modine cooling products. These comprise Modine Unit Coolers, both Cold Water and Direct Expansion Types, and Modine Cooling Coils, Cold Water Type. While the Direct Expansion Units are designed to serve a cooling function exclusively, the Cold Water Type Unit Coolers and Cooling Coils may be used for both heating and cooling. Bulletin 437 describes the Cold Water Units, and Bulletin 537 the Cold Water Coils.

Telegraph Code

ORDERS

ORDEX — Ship immediately by express to
ORDUZ — Ship immediately by freight to
ORDAD — Add to our order (give order number and customer's name)
ORDIF — Change specifications our order (give order number and customer's name)
ORDAY — Referring to our order
ORDKO — Referring to your order

ORDER NUMBERS

Order numbers can be coded into one word by substituting the letters of the alphabet for the figures: A = 1; B = 2; C = 3; O = 0; etc. For example, Order No. 13067, ordinarily telegraphed "one three zero six seven," can be coded "ACOFG."

QUESTIONS ON SHIPMENTS

SHARP — When and how did you ship our order (give order number and customer's name)
SHOAL — When and how will you ship our order (give order number and customer's name)
SHIKE — When will you ship balance of our order (give order number and customer's name)
SHUNT — Hold shipment on order (give order number and customer's name)

TELEGRAMS, LETTERS, TELEPHONE

RETEL — Referring to your telegram of
REDUX — Referring to our telegram of
REMAL — Referring to your letter of
RECOG — Referring to our letter of
REFONE— Referring to our telephone conversation

UNIT HEATER MODEL NUMBERS

FOR STEAM			FOR HOT WATER		
UNCUB	— Model	76	UNCUB	— Model	73-W
UNLIB	— "	126	UNWRY	— "	212-W
UNYUN	— "	152	UNWAR	— "	279-W
UNLAT	— "	181	UNWIZ	— "	399-W
UNLOG	— "	204	UNWAY	— "	497-W
UNLEM	— "	238	UNWIL	— "	605-W
UNDAK	— "	275	UNWEX	— "	793-W
UNDIG	— "	352	UNWHO	— "	1010-W
UNDOW	— "	440	UNWAT	— "	1303-W
UNFIV	— "	542			
UNSIX	— "	620			
UNSEV	— "	710			
UNINE	— "	903			
UNELV	— "	1163			
UNERT	— "	1300			
UNUFF	— "	1545			
UNUTT	— "	2015			

MOTORS

MOTEN — 110 volt, 60 cycle, single phase
MOTAG — 220 volt, 60 cycle, single phase
MOTIV — 220 volt, 60 cycle, three phase
MOTUK — 440 volt, 60 cycle, three phase
MOCRO — 115 volt, D.C.
MOCUF — 230 volt, D.C.
MOBOL — Two-Speed
MOBAR — Three-Speed

In telegraphing orders for unit heaters, start with the Code Word advising how you want the material shipped. Then state number of units. Then the Code Word for the Model number of the units required. Then the Code Word for the type motors required.

The following will illustrate how to telegraph an order for immediate freight shipment of 18 Model 542 Modine Unit Heaters, equipped with 220 volt, 60 cycle, three-phase motors; also 2 Model 152 Modine Unit Heaters, equipped with 110 volt, 60 cycle, single-phase motors:

"ORDUZ us Eighteen UNFIV MOTIV and two UNYUN MOTEN"

MODINE SALES OFFICES

Albany, N. Y., Ernest E. Malpass, 1039 Broadway, Industrial Bldg., Albany 45610
Amarillo, Tex., Allan Engineering Co., Inc., 113 E. 13th St.
Atlanta, Ga., J. W. Hinchey, 152 Nassau St., N. W., Walnut 1122
Atlantic City, N. J., Sidney B. Strouse, 500-529 Guarantee Trust Bldg., Atl. City 53900
Baltimore, Md., Wm. I. Collier & Co., 522 Park Ave., Vernon 5236
Birmingham, Ala., Haydn Myer, 2224 Comer Bldg., 3-4645
Boston, Mass., G. A. Barrows Co., 10 High St., Liberty 0465
Bozeman, Mont., E. W. Bunnell, 622 W. Mendenhall St., Phone 639J
Buffalo, N. Y., J. A. Sullivan, 112 Groveland Ave., University 6590
Caldwell, Ohio, I. E. Danford, 827 West St., 67-J
Charlotte, N. C., Earl G. Embree, 711 Clement Ave., P. O. Box 1867, 2-3550
Chicago, Ill., D. S. Paden, 737 North Michigan Ave., Rm., 421, Superior 0510
Cincinnati, Ohio, Harry A. Pillen, 622 Broadway, Rm. 209, Bldg. Indus. Bldg., Cherry 2440
Cleveland, Ohio, G. A. Rock, Newman - Stern Building, 1740 East 12th Street, Cherry 1970.
Columbus, Ohio, A. F. McGovern, 83 So. High St., Rm. 318, Main 1744
Dallas, Tex., Allan Engineering Co. Inc., of Dallas, 2712 Live Oak St., 3-3816
Dayton, Ohio, The Graves & Marshall Co., 716-726 E. Monument Ave., Fulton 8931
Denver, Colo., Harry H. Herman, 1226-1228 California St., Tabor 4505
Detroit, Mich., George W. Akers Co., 16525 Woodward Ave., Townsend 8-5640.
Elizabeth, N. J., Htg. Equip. Sales Co., 259 No. Broad St., Elizabeth 2-1425
El Paso, Tex., Geo. W. Herlin, 401 No. Santa Fe St., P. O. Box 512, Main 8
Erie, Pa., P. A. Nash, 507 Cherry St., 24-325
Fond du Lac, Wis., A. N. Goff, 94 Eighth St., Fond du Lac 6973
Fort Worth, Tex., Allan Engineering Co., Inc., of Fort Worth, 1003 First National Bank Building, 2-5113
Grand Rapids, Mich., Jay K. Richmond, 906 Fairmount St., S. E. 84007
Hartford, Conn., J. M. Augur, P. O. Box 744, 32-3465
Houston, Tex., Allan Eng. Co., Inc., of Houston, 3616 Main St., Hadley 3403
Indianapolis, Ind., C. A. Will, 5402 Broadway, Humbolt 3141
Jacksonville, Fla., H. L. McMurry, 418 No. Main St., 5-7297
Jokake, Arizona, Evans Construction Co.
Kansas City, Kan., The Darby Corporation, 923 No. Third St., Drexel 1441
Knoxville, Tenn., Plumbing & Heating Sales Co., 408 W. Clinch Ave., P. O. Box 1363, 3-8212
Los Angeles, Cal., R. M. Gunzel & Co., 320 Crocker St., Michigan 2363
Louisville, Ky., Lewis & Hancock, 327 Breslin Bldg., Jackson 8952
Madison, Wis., C. H. Power, 1706 Yahara Place, Badger 4317
Memphis, Tenn., C. J. Gaskell, 1011 Falls Bldg., 8-3447
Milwaukee, Wis., W. F. Boden, 420 E. Wells St., Marquette 7626
Minneapolis, Minn., Heating Equipment Co., Rm. 830, Plymouth Bldg., Atlantic 2235
Moline, Ill., A. H. Belouske, 2708 14th Ave.
New Orleans, La., R. K. Rothrock, 5316 Dryades, Upt., 3466
New York, N. Y., R. D. Tyler, 1734 Arch. Bldg., 101 Park Ave., Ashland 4-6832
Oklahoma City, Okla., Loeffler-Greene Supply Co., 1604 N. W. Fifth St., 3-5315
Omaha, Neb., Air Conditioning Utilities, Inc., 1810 Harney St., Web. 2900
Philadelphia, Pa., Wm. Kidd, Rm. 106 Wilford Bldg., 33rd and Arch Sts., Evergreen 1708
Pittsburgh, Pa., P. F. Moser, 207 Fulton Bldg., Atlantic 3114
Portland, Ore., J. A. Schneider, 1132 N. W. Glisan St., Broadway 2643
Racine, Wis., H. P. Connolly, % Modine Mfg. Co., Jackson 500
Raleigh, N. C., B. C. Allen, 211 S. McDowell St., 2017
Richmond, Va., Shultz & James, Inc., 7 No. Sixth St., 2-3965
Rockford, Ill., R. E. Burden, 232 Grand Ave., Parkside 49-R-2
St. Louis, Mo., R. J. Smith, 7707 Lile Ave., Sterling 1313
Salt Lake City, Utah, A. A. Maycock, P. O. Box 3, Wasatch 4871
San Antonio, Tex., E. G. Langhammer, 436 Main Ave., Fannin 1802
San Francisco, Calif., P. J. O'Meara, 50 Hawthorne St., Sutter 6743
Savannah, Ga., Bergen & Peck, Mendel Bldg., 5528
Scranton, Pa., L. A. Howley, 219 Miller Bldg., 4-5377
Seattle, Wash., W. W. Cox, 326 Columbia St., Campbell Bldg., Main 8661
Syracuse, N. Y., H. V. Boggs, 324 Roosevelt Ave., 6-1636
Texarkana, Ark., Allan Engineering Co., P. O. Box 604, 2358-J
Toledo, Ohio, Ralph Shawaker, 132 Summit St., Adams 7825
Warren, Ohio, P. F. Moser, 171 Homewood Ave., P. O. Box 824, 4392
Washington, D. C., 522 Park Ave., Baltimore, Md.
Wichita Falls, Tex., Allan Engineering Co., Inc., of Wichita Falls, 805A Brooke St., Phone 4223 or 6610
Wichita, Kan., J. M. O'Connor, 208 North Waco, P. O. Box 2253, 2-3484
Wilkes-Barre, Pa., F. A. Dockeray, Rm. 718, Wilkes-Barre Deposit & Savings Bank Bldg., Phone W. B. 3-7536
York, Pa., Paul E. Sowers Co., 139 W. King St., 2597
Canada, Toronto, Ont., A. H. Hills, Federal Bldg., 85 Richmond St., W., Waverly 3720
England, London, Utilities (London) Ltd., Walton House, 1 Newman St.
New Zealand, Christ Church, 643 Colombo St., Taylors Ltd.

MODINE MANUFACTURING COMPANY
RACINE, WISCONSIN

.005-8-37

HEATING EQUIPMENT SALES CO.
251 NORTH BROAD STREET
ELIZABETH, N. J.
TEL. ELIZ. 2 - 1425

PRODUCTS OF THE HEATING AND AIR CONDITIONING DIVISION

Modine Unit Heaters
for Industrial Heating and Drying

Modine Copper Radiation
for Domestic and Commercial Heating

Modine Blast Heaters
for Ventilating and Air Conditioning Systems

Modine Humiditioner
a Domestic Humidifying and Cooling Unit

Modine Unit Coolers
Cold Water and Direct Expansion Types—for Industrial and Commercial Cooling

Modine Cooling Coils
Cold Water and Direct Expansion Types—for Air Conditioning and Cooling Systems

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